Astounding
A
SCIENCE FICTION
REG. U. S. PAT. OFF.
JANUARY 1947
25 CENTS

TOMORROW AND TOMORROW

BY LEWIS PADGETT

AFTER THE PARTY

Look out for a Cold... *Gargle* LISTERINE ANTISEPTIC

GOING from over-heated rooms into the chilly night air often can lower body resistance so that cold germs called the "secondary invaders" may invade the tissue. After a party it's only sensible to gargle with Listerine Antiseptic when you reach home because this precaution may forestall a mass invasion by these germs.

While a virus is believed to start many colds, certain threatening germs called the "secondary invaders" produce many of those miserable symptoms of a cold and its complications.

Anything that lowers body resistance, such as wet or cold feet, drafts, fatigue, or sudden change of temperature, may make it easier for the "secondary invaders" to stage a mass invasion of the tissue.

Listerine Antiseptic—Quick!

So, when you've been thus exposed, gargle with Listerine Antiseptic at once. Used early and often Listerine Antiseptic, because of its amazing germ-killing power, may halt such mass invasions... may help head off the cold entirely or lessen its severity.

It is the delightful precaution that countless thousands use regularly, night and morning, and oftener when they feel a cold coming on.

Fewer Colds and Sore Throats in Tests

Bear in mind that tests during 12 years revealed this impressive result: Those who gargled with Listerine Antiseptic twice a day had fewer colds and usually milder colds than those who did not gargle...and fewer sore throats.

Get into the habit of using Listerine Antiseptic regularly and, at the first sneeze... the first tightening of the throat or other signs of a cold... increase the frequency of the gargle, meanwhile seeing that you get plenty of rest, that you keep warm, and that you eat wisely.

LAMBERT PHARMACAL CO., *St. Louis, Mo.*

Germs Reduced up to 96.7% in Tests

Fifteen minutes after a Listerine Antiseptic gargle, tests showed bacterial reductions on mouth and throat surfaces ranging up to 96.7%, and up to 80% one hour after a Listerine Antiseptic gargle.

Sometimes you can break a good rule!

It's usually a wise rule not to plan a chicken dinner before the eggs are hatched.

But not always!

If the "chicken dinner" represents your future, and the "eggs" are financial nest eggs—go ahead and plan!

Especially if your *nest eggs* are U. S. War Bonds and U. S. Savings Bonds. For your government *guarantees* that these will hatch out in just 10 years.

Millions of Americans have found them the safest, surest way to save money . . . and they've proved that buying Bonds on the Payroll Savings Plan is the easiest way to pile up dollars that there is.

So keep on buying Savings Bonds at banks, post offices, or on the Payroll Plan.

Then you *can* count your chickens before they're hatched . . . plan exactly the kind of future you want, *and get it!*

SAVE THE EASY WAY... BUY YOUR BONDS THROUGH PAYROLL SAVINGS

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Astounding
SCIENCE FICTION

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Editor
JOHN W. CAMPBELL, JR.

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Monthly publication issued by Street & Smith Publications, Incorporated. 122 East 42nd Street, New York 17, N. Y. Allen L. Grammer, President; Gerald H. Smith, Exec. Vice President and Treasurer; Henry W. Ralston, Vice President and Secretary; Franklin S. Forsberg, Vice President. Copyright, 1946, in U. S. A. and Great Britain by Street & Smith Publications, Inc. Entered as Second-class Matter, February 7, 1938, at the Post Office at New York, under Act of Congress of March 3, 1879. Subscriptions to Countries in Pan American Union, $2.75 per year; elsewhere, $3.25 per year. We cannot accept responsibility for unsolicited manuscripts or artwork. Any material submitted must include return postage.

$2.50 per Year in U. S. A. Printed in [redacted] the U. S. A. 25c per Copy

NEXT ISSUE ON SALE JANUARY 21, 1947

ATOMIC WEAPONS—SUBMICROSCOPIC SCALE

The atomic bomb, man's biggest weapon, is also man's smallest. The large-scale effect can be used only destructively, but that small-scale atomic bomb, the radioactive nucleus, can be used to great good effect. At present, it is being used primarily in biological tracer chemistry, simply serving as a tag, the atomic equivalent of bird-banding.

But the weapon aspect of the radioisotopes is still far from full development. There will be centuries of work in that field alone! The possibilities of radioisotopes as medical agents has already been fairly thoroughly investigated, and with only two exceptions, it has been shown that the radioisotopes of the elements aren't very useful agents. Radioiodine can, definitely, be extremely helpful in treating thyroid conditions—but not cancer of the thyroid particularly. If it is simple hyperthyroidism, radioiodine can replace surgery with neatness, cheapness, and far better control.

In pernicious anemia, the blood-forming cells of the bones almost cease production of red blood cells—with disastrous results to the person involved. There is a converse of that condition, in which metabolism goes haywire the other way, producing a vast excess of red blood cells. This is not a cancerous condition—just upset metabolism, similar to hyperthyroidism's excess production of thyroxin. Radiophosphorus has been found to be an excellent treatment for that inverse anemia. It gives quick, striking relief, and can be used to control the situation with excellent results.

But radiophosphorus is not particularly useful in leukemia—blood cancer. To date, no radioisotope of any element has been found particularly helpful in cancerous conditions, save as the radioisotope is used as a source of X rays. (As radium has been for years.)

But radioisotopes *can and will be used.* The lack of success to date is due simply to the fact that radioactivity will kill anything. Normal tissue as well as cancerous tissue. Phosphorus is used by growing cells—normal or cancerous. Both types take it up, both types are killed.

What we need is a chemical that is absorbed by cancerous cells, but not by normal cells; then we can synthesize that compound—no matter how harmless that substance may be in itself!—using radioisotopes. Chemically harmless, when the cancerous tissue selectively absorbs it, it will be conveniently accepting delivery of a time-bomb.

Instead of trying to find a *radioactive element* which the cancerous tissue selectively absorbs—there are only ninety-six to choose from—we will seek a complex organic chemical compound—Lord only knows how many hundreds of millions of those there are to pick from!—and use the radioactive isotope as a weapon mounted, concealed, in the organic chemical carrier.

THE EDITOR

BY LEWIS PADGETT

With the best of good intentions, someone was trying—and trying hard! —to start an atomic war that would blow their civilization off the map!

TOMORROW AND TOMORROW

Illustrated by Orban

I.

He knew it was a dream when he shot Carolyn through the head. But not until then. The imperceptible shifting from reality to the familiar nightmare had come, as always, so stealthily that the shock of surprise almost woke him. Then there came the thought: *I must tell the Controllers.*

And after that: *But in three weeks there'll be the quarterly psych check, and they'll find out anyhow.*

Standing, he looked down at the motionless gray head aureoled in spreading red, and listened, and made a bargain with himself. *If I can't get rid of this recurrent dream, this warp, this compulsion before the psych check, I'll be fired automatically. There can't be any danger from a dream. It's merely a fear-dream; it can't be wish-fulfillment.*

The thought chilled him horribly.

He dreaded the next moment, when the pattern of weeks would repeat itself, and he would straighten up above the narrow table, with its intricate controls and warning signal lights, and turn toward the door that led to the unthinkable.

But he turned.

Tomorrow I'll report to the psych board.

It won't mean being fired, really. Not washed up. I'll simply be re-

conditioned and tested. But I can never hold this post again!

The ancient, powerful conditioning of his early environment stirred in savage rebellion. *I can't give it up! The highest honor in the world—*

He walked down the passage. He made the secret signals that permitted his safe ingress. But he knew it was impossible; there were protective devices that even he did not know how to deactivate. In real life, he could never have penetrated this far toward—toward it.

The dream blurred. There was a confusion of nightmare.

That coalesced suddenly. He found himself in the brain and the heart. He stood before It.

And as always he felt that what he had to do was impossible. He had been chosen and trained for his post simply because his psychological background was entirely trustworthy, a more important factor than his technical training. Yet the perverse devil hung on his shoulder, laughing.

Of course, if I were awake, I would never do it. But in a dream—

Do it. It's the release I need, said the devil at his shoulder. *The release you need. That we need. You're under terrific tension, and you're neurotic and worried for fear this very thing will happen. So get your release. A dream is harmless.*

Somehow in the dream it was rediculously easy to do. You merely had to detach the boron dampers and pull them out. But what had happened to their locks?

He watched the gauges on the walls. Geiger counters began to chatter insanely. Needles rose in jumpy, warning spasms as the dampers were withdrawn. The critical mass had nearly been reached.

But it's only a dream, of course, he thought, as he woke amid the inconceivable fractional-second beginning of the atomic blast.

II.

Joseph Breden made himself sit motionless. He opened his eyes slowly, saw the tri-di chessboards in front of him, red and black, and let his lids drop against the light. But the light was not dazzling. A chain of reactions leaped through his mind; he drew a long breath of relief. He could not have been asleep longer than a few seconds, or his pupils would have contracted against light that would have seemed blinding to him.

There was no reason to feel surprise. It always happened this way. But there was always the sense that he had been asleep for a long, long time, and that Carolyn Kohl would have noticed. She would have had to report him then. Though that would scarcely have been necessary, with the built-in visio-recorders always focused on the guardians who sat in this room, and in two others elsewhere in the enormous sunken ziggurat.

He tapped one finger a little on the table, to show Carolyn he was awake. The recorders would catch that, too, on their wire tape. A small panic touched him. He stared at the chessboards, pawn, knight,

bishop, king; to save his life he could not remember the gambit, and whose move it was. He had a feeling that this exact situation had occurred before. He remembered—

His mind leaped on ahead, taking fire with its own irrational hysteria. He had to make the right move. It was vital. If he didn't Carolyn would notice and suspect, or the recorders would, and he would be investigated and psych-checked and lose his post; there would be disgrace—

Stop it, he told himself frantically. *Move any place. No, don't do that. Carolyn knows your game. The records note any deviation from the norm. But do something!*

His brain was empty. All he could feel was that flailing panic, and all he could sense was the silent terror far under his feet, the uranium pile that hovered below the critical mass, the incubus he guarded.

Something shifted, a soft rustle of motion, across the table, and the terror drained swiftly out of Breden. He knew, now, what it was he had feared.

He raised his eyes and looked at Carolyn Kohl. There was no cinder-edged hole marring her smooth forehead under the gray hair. A bulky, heavy-faced woman of sixty-eight, she lay back comfortably in her chair, sharp black eyes watching Breden through her contact lenses, her rather thick lips parted to show strikingly even white dentures. Though nearly seventy, she was still a top-flight nuclear physicist, and until lately had been better than Breden. But now she was slowing down a little, and Breden silently blessed that factor; if she had been sharper, she might have suspected something.

She was sharp, though. And Breden knew he could not go on with the game. He had to find an out. That wouldn't be easy. There must be no deviations from his habit-patterns for the recorders to pounce on. The cool, soft light of the room was smothering.

The tension was growing again within him.

He thought of Margaret. But his wife's familiar features blended, somehow, with the dark, placid, confident face of his brother Louis. And instantly all stability left him. It had always been that way, since he was old enough to understand that Louis was different, though not until years after that did he fully comprehend why his brother was a member of the strangest club that had ever existed on earth.

A club of the cursed and the blessed. The damned and the saved. And membership was strictly limited; it was so highly exclusive that you had to be born into it. You had to have been born within the effective limits of a chain reaction—not so close to the monstrous center that you disintegrated or were charred or died more slowly, with your flesh flaking off and your bones rotting, and not so far distant that your parents' genes and chromosomes were unaltered. You had to have been in

exactly the right place at the right time. It had only happened a few times since 1945, in Japan and New Mexico, and, some years later, in other localities, but the atomic explosions had salted humanity with a few very special specimens. Not supermen, although rumors were still highly popular about mysterious, omnipotent figures who stayed godlike in the background and moved humans like puppets. That was standard stuff in the television shows. The truth was less flamboyant, as usual. The mutants were a mixed breed. Some survived, but neither the best nor the worst. They were, however, better than humans in a number of ways. Not that they weren't human themselves; it was semantically wrong to consider them alien. They were merely humans extended, just as Louis had been. As Louis *was*.

The old hatred and love and shame and fear flooded back, and Breden began to hear a totally imaginary throbbing from beneath his feet, the heartbeat of the uranium pile that was, in reality, simply a machine, waiting, latent and still, for its use to come. It was a symbol, nothing more. Its use *had* come. But that use would fail entirely if it ever reached critical mass.

It throbbed!

Its gigantic pulse crushed rhythmically into Breden's brain!

For the first time in years he acted on impulse. He reached out at random and moved a knight on the nearest board. And, as he did so, he realized that he had made a serious mistake.

But nothing happened. Only the eyes of the recorders, watching from the walls, irretrievably photographed the blunder that did not jibe with Joseph Breden's mental and habit patterns. It would never be ignored. Breden thought: *I must think of an alibi. There'll be questioning—*

Carolyn said lazily, "What the devil's the matter with you, Joe? Got a fixation or something?"

Breden said, "I guess you've licked me so often I've developed a chessboard death-wish."

"Well, you're certainly asking to be murdered," she said, grimacing at the board. "No use playing this through. I'd have you in three moves. Want some coffee?"

Breden nodded. He lay back, weak with relief, exhausted from the long-maintained tension, but still knowing that he had to be wary. There was still a chance of retrieving his blunder. Carolyn, no psychologist, didn't comprehend the significance of that inexcusable knight's move, but the Controllers' psychologists would know, or at least wonder and investigate. Not even the slightest shadow of a doubt must fall upon the guardians of the sunken ziggurat.

He studied Carolyn as she ordered coffee. Nearly seventy. A new thought came, and he was briefly shocked at himself. If he could throw suspicion on her, somehow, lay the blame for the lapse

on her shoulders— She was approaching the age when she would be no longer a perfectly functioning machine. She was, even now, the oldest of the technical crew. If he could make the responsibility hers, broach, somehow, a hint that the beginnings of senility were weakening her keenness—

He phrased a reply to a hypothetical question: *I've been letting her win at chess. I felt sorry for her, a little. She used to be able to lick me easily, but not any more.*

It would have to be subtler than that to convince the questioners. Yet the germ of the idea remained. Breden tried to put it away. He thought of his mutant brother again, and, as always, became conscious of his own weaknesses; but that brought its own cure. If he lost his job now, it would prove that Louis was the better man.

The thermobulbs of coffee popped into the analyzer, hesitated a moment while gadgets ascertained that no dynamite, uranium isotopes, or cyanide was being smuggled in, and then slid smoothly to the table. Breden turned his around till he found the right place and pushed in the sugar-cream lid. He watched it dissolve. Carolyn said something.

"Eh?"

"Margaret. Your wife. You remember. You married her, or has that slipped your mind? It's no use trying to work out the right gambit now; the game's over."

Not the real game, Carrie.

He said, "Oh, I'm sorry. She's up in the Rockies, near Denver. Thought the change of air might be good for her."

"It's her first baby, isn't it?"

Breden nodded. Carolyn sipped coffee and watched him over the rim.

"Cheer up," she said abruptly. "I know what's bothering you. But you've got the Mendelian law on your side."

Another out?

Breden said, "I guess I'm a little worried, Carrie. My brother *is* a mutant."

"But your parents weren't," Carolyn said. "Go see a good geneticist. Of course nothing new has been discovered for a hundred years; we can't afford research in these times. But we certainly know enough about genes. How old is Louis, anyway?"

"Fifty-two. He's twenty-two years older than I."

"Well, good gracious," Carolyn said, looking slightly like an indignant, though more sophisticated, Queen Victoria. "Even though your parents *were* exposed to the hard radiations—where was it?"

"The Hawaiian experiment in ninety-two."

"Well! The gene-pattern trends back toward the norm. And in twenty-two years—! You can feel sure your parents were normal by the time you were conceived. There's no question about Margaret's heredity, is there?"

"Mutation? No. No exposure. Her grandfather worked with X rays, but that was all."

"X rays," said Carolyn, with the scorn of one who worked with mesatrons and went on from there. "Your child won't be a mutant. He can't be."

"Unless I disprove that empirically," Breden said. "You're talking theory. There's been no independent research along those lines—along *any* lines—for a hundred years"—conscious suddenly of the watching recorders, he added—"which is a very lucky thing. It *could* happen that my parents were accidentally exposed again before I was born; they'd have been prone to the effect, after the first exposure."

"You're no mutant."

"Might be latent in me. Recessive."

"It's impossible," Carolyn said decisively. "And, at worse, you'd have a mutant child like Louis. He's quite a big shot, isn't he?"

"He is. His I. Q. is remarkable. He's also got alcaptonuria. His blood hasn't got the enzyme that takes care of alcapton through oxidation. He has one defective gene. When you do get a mutant, it upsets the apple cart, and while certain genes may be wonders for the I. Q. and so forth, there's always the danger of a corresponding quirk somewhere. That's why so few of the mutants lived. They were mostly freaks."

"Louis gets along, doesn't he?"

"Alcaptonuria isn't serious. But suppose I have a child with phenylketonuria?"

"It sounds pretty bad," Carolyn admitted. "Is it?"

"No, it just means that a certain acid in the blood isn't changed—unfortunately, phenylketonurics are always imbeciles or idiots, too. The central nervous system is affected. They're always mentally defective, Carrie."

"I hope you haven't told Margaret these cheerful little ideas of yours," the woman said. "Even I know you're all wrong."

"It's an occupational disease of potential parents. Ever since the first mutants were born, people started to worry if they were expecting a child. Oh, well. I guess you're right. When the kid's born, I'll take a look at his medical charts and be able to relax."

"Aren't there any prenatal charts?"

"Sure. But . . . ah, forget it."

Carolyn studied him. "Why don't you go and see Margaret?" she suggested. "She might be having similar ideas. Cheer her up."

"She's cheerful. A little peaked physically, but the Colorado air ought to help that. I *am* going to see her; tomorrow's my last night here for a week."

"You don't have to tell me. I'm spending my time off in the Berkshires, with my grandchildren." Carolyn sighed luxuriously. "I'm not going to do a thing but work my fool head off. I'm going to bake bread and make rhubarb pies. I'm going to dust and sweep and paint the furniture. I'm going to dig in the garden."

"Good therapy," Breden said, and Carolyn snorted.

"Joe, sometimes you irritate me. It's *fun!* I wouldn't like it as a steady diet, but I grew up in a midwest farmhouse, and I loved it. Ever eat fresh-baked bread?"

"No. Why bother? You can't get refrigomeals—"

"Sure. A frozen Creole dinner is really something. Or a frozen Mandarin special. We never had those on the farm, and I couldn't do without 'em now. But no quick-freezer can give you fresh-baked bread, either; it can't give you the smell of it, which is half the pleasure. 'I came across no wine more wonderful than thirst,'" Carolyn quoted.

Two men came into view on a visor screen—the relief crew. They said hello, while they stood in the entrance chamber and were thoroughly checked before admittance. Fingerprints, the rod-and-cone patterns of their eyes, respiration, pulse; traces of radioactivity on their clothes—a highly unlikely contingency, since nobody went near the forbidden sites of Hiroshima, Nagasaki, Hilo, the New Mexican danger area, or the few other scattered radiation radii. Dust samples were analyzed; the brain's energy-pattern was recorded and checked; finally Sam Carse and Wilbur Fielding were discovered to be Sam Carse and Wilbur Fielding, and were admitted to the sanctum.

"Well, take over," Carolyn said, getting up a little stiffly. "I guess Baby won't explode tonight."

And suddenly they were all quiet, listening, while four pairs of eyes moved with experienced swiftness across the faces of dial and gauge. But only Breden felt that dreadful, impossible pulse come up from below and vibrate through his body and shock against his brain.

Uranium Pile One.

If Archimedes had had this lever, he could have moved the world.

A voice from the wall said, "Breden, report to M. A. before you check out."

No one commented; the reactions of Medical Administration were erratic and unpredictable. But Breden thought: *I must get help! Somewhere—somehow—*

First, though—there would be the matter of tricking Medical Administration.

III.

The only thing that could save Breden from having the veils ripped from his mind was the common phobia of all technicians, that he himself shared. Research men *could* think along experimental lines; they could scarcely help doing so or they wouldn't have become researchers in the first place. But they didn't do it in public. Implanted in their conscious was the idea of wrong-doing whenever they touched on independent research. It was *contra bonos mores. Status quo* was the ideal. A man who discovered how to draw free energy out of the air would have been suppressed, like the guinea

pigs in "Alice," had he been rash enough to announce his success. Guinea pigs, in fact, were not the popular little research controls they had once been.

It was likely, though, that a man discovering how to utilize free aerial energy would have forgotten his method as soon as he could. Unless strongly antisocial, he would have, instead, concentrated on perfecting some method to make independent research impossible. For *status quo* was the safety and the ideal and, by propagandized psychic implantation, the norm.

Civilization and technology had, in the middle of the twentieth century, approached the critical mass. Only the creation of the unified world government, with its practically unlimited powers, could have kept the global pile from beginning a fatal chain reaction. That was axiomatic.

So the technicians depended on safe axioms.

The patient is uneasy, apprehensive, insecure and fearful.

Dr. Hoag was a smiling little fat man. He said that they were getting a detailed report from Margaret's clinical observers, with special reference to biology and genetics. "So that should relieve your mind about the danger of having a mutant baby," he told Breden.

Three other psychiatrists regarded Breden thoughtfully. Breden said he knew it was illogical, but he couldn't help worrying a little. He hoped it didn't show in his work.

"You're too good a man to lose," Dr. Hoag said, glancing at a stack of cards and tapes on the desk before him. "Of course we can't take chances—*you* know that. But this doesn't look serious. You made a wrong move at chess. All we want to do is find out why."

"Couldn't it be an accident?"

"Nothing is an accident," said one of the psychiatrists very wisely.

"Mm-m-m," Dr. Hoag grunted. "This Wechsler test you just took, Breden—it's not conclusive, but it's indicative. So are these doodles of yours, and the association check-up. I know it's natural for you to be worried about the uranium pile, but you've always compensated nicely till now."

Breden waited. He had rigged the tests as much as he had dared. But he didn't know whether or not he had managed to outguess the psychiatrists. This wasn't the exhaustive check-up the Controllers supervised, or the arduous psych tests, with their mechanical detectors and their thoroughly efficient exhaustiveness. This was simply routine. At any rate, the psychiatrists thought so. They weren't expecting real trouble. But if he'd given himself away in the tests, if they found out about his recurrent dream—!

Hoag said, "We're agreed on the main point, though. I want you to listen to this closely. You play chess with Carolyn Kohl. You don't want her to lose."

Breden frowned. "I don't quite

agree with that. It's natural to want to win, isn't it?"

"Normally. But in the past Carolyn Kohl has showed herself a far better chess player than you. Lately, these tests of yours show, you've found her easier to beat. But you haven't won many games. Now why is that?"

"I don't know," Breden said politely.

"Because you haven't let yourself win. You'd rather make an obviously fatal move for one of your own men than prove to yourself something you've been trying to ignore. The fact that Carolyn Kohl has become inefficient. She is sixty-eight years old. She is slowing down. The earliest beginnings of senility are beginning to affect her bran. And she holds one of the most responsible positions in the world. She guards the uranium pile."

Breden said, "But . . . Carolyn—"

"Am I right?"

Breden didn't answer.

Dr. Hoag said, "You know what depends on the safety of keeping this unit below CM. And critical mass is something you can't play with. The physicists who are selected for this duty are very carefully chosen. And once a month they're given a psych check. The efficiency of the organization *must* be perfect. If it isn't, if the human factor fails at one point, there's the danger of an atomic blast. And that can mean the end of civilization."

It would. That, too, was axiomatic. That had been dinned in the ears of the world for a hundred years. Safety lay in only one thing; keeping the uranium piles and civilization below the critical mass.

"All right," Hoag said, leaning back. "Naturally you're afraid. You don't dare let yourself realize that the human factor, represented by Carolyn Kohl, is failing. So you try to assure yourself that she's *not* failing. The symbol is chess. As long as she can beat you at chess, you can feel safe in assuming that she's not weakening. That explains your deviation from the norm. So. Now look at these."

He pushed a card and a tape toward Breden, who took them and looked inquiringly at the psychiatrist.

Hoag said, "Latest report on Carolyn Kohl. I've had some of it put into language you can understand. It should reassure you. She's still at par. Your phobia is imaginary. It can be eliminated. There is no trace of approaching senility in her mind or body."

One of the medics said, "Dr. Hoag—"

"Just a moment, please. Breden, please study those reports. We'll be back soon."

Hoag rose and went out with the others.

It had worked, then. There would be another routine test tomorrow night, when he came back on duty, but he was safe for the nonce. And, after all, Carrie hadn't suffered. His momentary twinge of guilt died; he hadn't

hurt her by passing the buck. And he had saved himself.

Nevertheless conscience stirred. As far as he knew, there had been no question till now of Carolyn Kohl's capabilities. He had implanted the first doubt. Nothing would come of it as yet, but the psychiatrists, he felt certain, would from now on watch her tests with a more stringent eye. But that wasn't his affair! Anybody who became really incapable shouldn't be on the staff here.

His heart lightened almost tangibly as the elevator rose through the enormous ziggurat.

The ziggurat. The coping stone. The keystone of the arch. Uranium Pile One. The one thing that now, quite strangely, after a hundred years, the security of the world depended on—more than merely a symbol, it was the Power itself.

A protective thought came: *is it more than a symbol, after all?*

A hundred years ago, fifty years ago, even, the human factor was more important. Now there were the machines. He and Carolyn Kohl and the other nuclear physicists—weren't they purely ornamental, by this time? For if the terror ever reached CM, what could the human factor do that the protective machines could not do better?

Was the human guard merely a guard of honor—an anachronistic symbol? Or worse—now? What had once been a strength might have become a weakness. The machines were enough. They could never turn traitor.

But he could.

His orders were checked; he was cleared; and in the pearly gray dawn the helicopter rose aslant along the air channels. Unseen radar watched him. He instinctively reached for the controls, but any deviation from the robot-charted course would be dangerous. He forced himself to relax, fumbling out a cigarette, type-sedative, and sucking it alight. He looked down, watching the patterns on the sea.

Too much time! He snapped open the small bookshelf and tried to find something there. Technical books, a few novels, a western—left by Carrie, of course, he realized—and a stack of wire-tape book reels. He did not even glance at the titles of these. He sank back again, closing his eyes and inhaling deeply on the half-narcotic smoke.

He tried to make plans.

There was no use worrying about this delay; no jet planes were allowed in the vicinity of the island that based Uranium Pile One. It was forbidden area, clearly marked as such on the aerial maps. Radar intercepters would have done their best to open the batteries at any unexpected intruder. It wasn't infallible; in a barrage of rockets, some would have got through, but where on earth could be based such weapons? GPC—Global Peace Commission—made certain that

there could be no base that might threaten security.

In 1950 that would have been impossible. In the ancient rivalry between ballistics and armor the balance has gone back and forth as new weights have been placed in the scales. Build a better mousetrap, and eugenics will breed a better mouse—more adaptive, perhaps.

But if the geneticists are on the other side—

The experiments of UNO had culminated, after the abortive start of World War III, in GPC. Not at once. That had taken time, after the riots, the mutinies, the intrigues and the detonations had died down. There was chaos for a while. From 1946 on, the nations had been, naturally, afraid of one another. Power politics hadn't halted when Japan and Germany capitulated. Social postwar problems worried a neurotic, convalescent world. Unemployment, strikes, famine, the old labor vs. capital rivalry, economic fights between countries, blocs, and areas—the merry-go-round was still whirling.

Then the merry-go-round broke down.

International espionage was a highly developed art, squared by the new achievements of the technicians. The race for atomic power went on underground. True, the atom blast had been developed, but there must be easier ways—deadlier ways. *There were!*

One nation began it. But before the bombardment had really started, six other nations were unloosing their atomic power. Some of them couldn't help it. The atomic bombs secretly planted in their vital areas and key centers had been detonated by other bombs they themselves were sending up.

It was an abortive war, because no one had really counted the cost. The politicians, demagogues, and war makers had simply not comprehended what atomic power meant. To them, it had been just another weapon.

That was when GPC took—or was given—power.

It had been stronger than the League of Nations and stronger than UNO. But not strong enough. That was proved; it could not cope with an aggressor country. However, paradoxically, it could cope with a dozen aggressors, and it could do that efficiently.

For the merry-go-round had broken down. The world was partly paralyzed. Nearly every key area was crippled. But GPC remained mobile, and it was, being international, decentralized. It was a loosely integrated unit physically, but a very tight one in all other respects.

Civil war helped, too. Take a typical nation—any one. It used its atomic bombs in an attack on its neighbor, and the secretly planted blasts within its own geographic body had detonated. The centers were smashed. They could be repaired, but not instantly, and meanwhile its neighbors threatened. A general seized power; he was defied by a politician; both of them were killed by a demagogue.

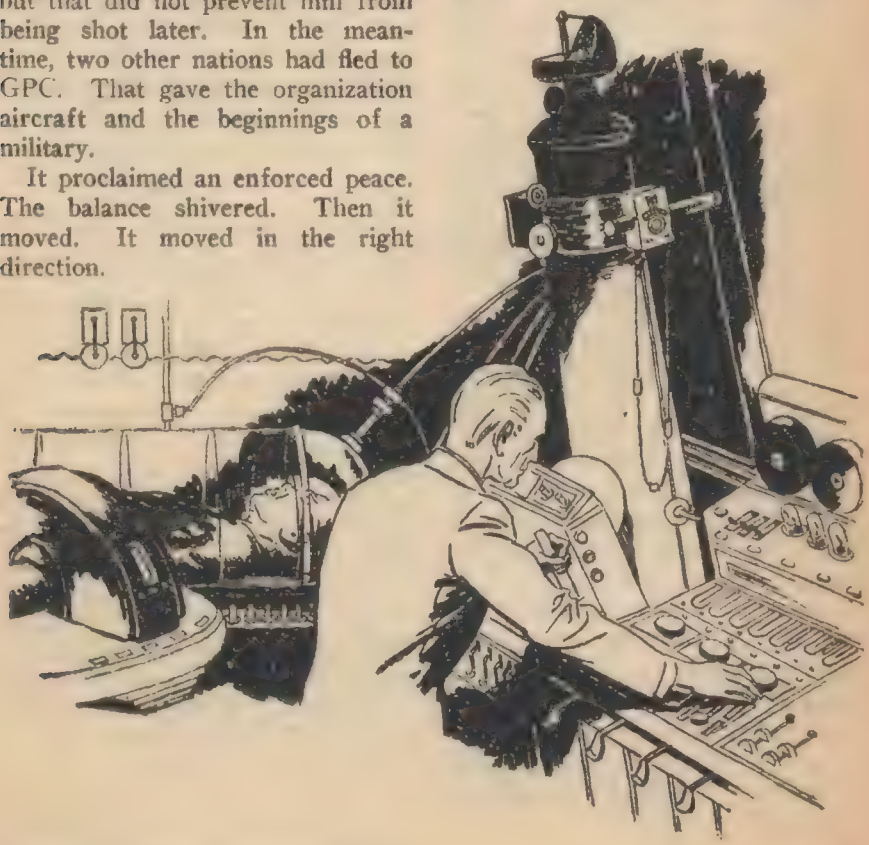
Meanwhile there were riots. In the military, there was mutiny.

And all of this—it took no time at all. This was an era of fast communication and transportation.

Only GPC remained functioning, and only GPC, with its specialized membership, had the knowledge and training for the necessary instantaneous social integration. The demagogue, seeing rivals rising, declared his country under the temporary jurisdiction of GPC. He did that to save his own hide, but that did not prevent him from being shot later. In the meantime, two other nations had fled to GPC. That gave the organization aircraft and the beginnings of a military.

It proclaimed an enforced peace. The balance shivered. Then it moved. It moved in the right direction.

For the war makers had found out, now, the true meaning of atomic power, and that global murder had been psychically contagious. The riots raging across the world had perhaps never been equalled in ferocious violence. When a man is in an ammunition dump that is on fire, he will have less hesitancy in firing a gun. The aim didn't matter. The administrators the people had depended on to save them had betrayed them, instead, and in blind fury the mobs turned on the nearest symbols that



they could destroy. They had atomic power, so it was not safe to rule.

It was not safe—except for GPC. GPC was the champion. It was the only tool that could steer the world away from the vicinity of the proximity fuse.

Most nations gave up their power willingly, although only temporarily. The others were whipped into line. Or else smashed. No nation could stand against a world organization that had a policy and power to enforce it. There were no party politics in GPC.

A policy and power. But such power had never been known or used before. It was, in the true sense of the word—*unlimited!*

After World War III, in sheer, blind panic and a fury for self-preservation, the globe stripped itself of weapons and armor. It gave GPC its military secrets, and if any were reserved, GPC took them too, and that made it possible for the organization to reach out and secure the hundred-year stranglehold that had maintained peace.

It was the only possible way.

But there was the inevitable danger that such a peace could not last.

GPC took stock, weighed the chances, and made its decision. It eliminated that peril. As long as the *status quo* held, there would be no war and atomic power could be controlled safely.

The scale had tipped in the right direction.

GPC reached out and gripped the scale. It held it motionless.

For a hundred years the grip had not relaxed.

IV.

Naturally there were changes. This wasn't the New York of 1947. But, on the other hand, it wasn't the lovely, strange metropolis it might have been with utilization of paragravity, antigravity, and contraterrene material. The new alloys made city engineering a pleasure, and the Old Districts had been razed decades ago—the areas that had escaped atomic-blasting, that is—but a few familiar things still lingered. Nobody called Way Six anything but Broadway; place-names are harder to change than topography.

The copter had taken Breden to the Pacific sea base, and from there a jet plane raced him across ocean and land to the eastern coast. He hadn't lost much time by going from west to east; the jet plane had been nearly fast enough to equalize the time lag. Still, it was morning in New York, early morning, and he wasn't sure whether or not Louis would be in his office yet.

He was.

The dark, impassive face showed on the televisor. Louis said, "Hiya, Joe. Off duty already?"

"Yes. Till tonight. What about breakfast?"

"I've had it hours ago," Louis said. "I'll take a sandwich and coffee, though; I'm about ready

for that. Hard work today! Let's see—where are you?" He looked up, reading the map light on the screen of his own visor. "O.K., at the Murray Hill. That suit you?"

"Why not," Breden said, and broke the connection. The thought of breakfast made his stomach feel queasy. He lit another sedative-cigarette and went into the nearest pneumo-tube terminal, trying to blank out his mind by studying the advertising placards.

At the Murray Hill it was difficult to open the subject. Besides, Breden didn't know how much he wanted to say. He talked idly, playing with his food, while Louis cheerfully gossiped and went into detail about his work. He was a bacteriologist; many mutants had gone into medicine of one kind or another.

"It's an atypical virus," Louis said, drawing a picture on the table top. "That doesn't mean a thing, of course. Still, it definitely puts it on the wrong side of the ledger. No research allowed. It's a pity, I suppose, but unless it develops into an epidemic, one can have only abstract interest in it. And if there should be an epidemic, the ban would be lifted, and we'd be assigned to research so we could give the little devil a label."

Breden looked at his brother. Not his brother, really, he thought. They'd had the same parents, but the same blood didn't run in their veins. How can you be kin to a mutant? And, as usual, Louis was the same casual, imperturbable success. You'd think he'd be a little self-conscious about being a freak!

Breden checked himself with a small start. What was going wrong between himself and Louis? This . . . feeling . . . was something new. He'd never disliked Louis before. He didn't really dislike him now. It was only that his brother made him feel gauche, embarrassed, self-conscious. But why? He was certainly as much of a success in his own field as Louis was in bacteriology.

Yes—but he'd had to work a lot harder at it! It was as though they'd both been born typists, and Louis' mutation had included a pair of extra hands. There was a hint of unfairness in it. Men were supposed to be created equal. Though, of course, they never were. The blind, precise rearrangement of genes took care of that thoroughly.

Suddenly he ached to surpass his brother in something—anything!

Louis' dark, friendly stare studied Breden. "What's on your mind?" he demanded. "I just told you there was a bubonic plague germ crawling up your arm and you nodded and said 'Sure, sure.' Is there trouble?"

Breden said, "Trouble? No. Why should there be?"

"*I* don't know. I don't even know why you came to see me, instead of stopping off in Colorado. After all, Margaret's there, not here. There's nothing wrong between you two, is there?"

There could never be that, Breden thought. He managed a smile.

"Relax," he said. "I'm just anxious for my week off, that's all. Overwork. It could happen to anybody."

"Yeah," Louis said, unconvinced. "I suppose those doctors out there —they know their stuff?"

"I'm healthy."

"Well, I'm no medico. But medicine's just a little too conservative these days. I know it has to be. But I always thought more of old Springfield than anybody else. He was a witch-doctor in a lot of ways. Just the same, a man like that—" Louis hesitated. "Efficiency is a wonderful thing. But the human organism isn't efficient. A slightly unorthodox GP with psychiatric leanings might be a good guy to balance your aseptic robot medics at your base."

Breden said stubbornly, "There's nothing wrong with me, Louis. The minute you see a man, you start looking for bacilli and taking his blood count."

"Not me. I'm a bacteriologist. People are just cultures to me. That babe over there." He indicated a handsome wench at a nearby table. "A hyperthyroid type. I can't help thinking what a wonderful broth she'd make for some nice germs. That's my first instinct. Luckily I have secondary reactions." He eyed the girl speculatively, but she ignored him. Louis sighed and turned back to his brother.

"Some nonpolitical group tried to get me to join 'em this morning," he said. "The Neoculturalists. Ever heard of 'em?"

Breden shook his head. "Should I know what they are?"

"Not necessarily. There've been a lot of these blocs lately, though. People always want to scratch. When they haven't got an itch, they imagine it. But there's no cure, I guess. There isn't any cure for shingles, though there could be. Itches in the body politic. Maybe it's some social virus. Do you suppose there could be any trouble, Joe?"

Breden, startled, said, "Of course not! Who'd make trouble?"

"People who itch," Louis said. "Not that they could do much. The minute a bloc gets too big, GPC steps in. But I can't help wondering—I'm no physicist. And I'm not asking questions; I know your work is top secret. I'm just idly asking if you've heard anything."

"Such as?"

"That's what I don't know. Call it trouble. I suppose you'd know if there were any extra precautions being taken?"

"I'd know, of course," Breden said. "I think you're the one who had better relax now. Nobody's going to drop an atomic bomb on our base."

Louis looked startled. "Lord, I hadn't considered . . . I merely thought there was a little more unrest than usual. More organizations and blocs. These boys were sounding me out about interplanetary travel."

"That's illegal."

"It isn't illegal to talk about it. But I admit it's unusual."

Breden said, "Interplanetary travel was banned eighty-five years ago, wasn't it?"

"Eighty-five years," Louis agreed, and his hand came up swiftly and touched the patch of gray at one temple. He seemed unconscious of the gesture. "We reached the Moon, and Mars—"

"And Venus," Breden said. "But only Venus was inhabited—and by an amphibious race. They didn't have atomic power or even jet propulsion. So it's safe to leave Venus alone. And of course it's safest to stay right here on earth. GPC can check bases here."

"I know the angle. Somebody might establish a base on the Moon and drop bombs. The difficulties are—"

"Are not insurmountable," Breden explained. "The time-lag might make all the difference; before we could locate the interplanetary base and destroy it, our centers could be smashed. And a few spaceships, being mobile, could drop bombs on Earth and skip around so fast we could never locate them."

"O.K., so these Neoculturalists thought we should have a few GPC controlled industries and ports on the Moon. They stressed the angle of GPC control."

"Lunatic fringe," Breden said.

"They're not the only ones. There are plenty of groups these days."

"But you can't allow interplanetary travel—"

"Oh, don't try to convince me," Louis said. "We're vulnerable now that we're centralized under GPC. If you live in big cities, you've got to make thoroughly certain that nobody can make bombs or drop them or have any bases. I believe it."

Competent, casual, perfectly satisfied, he sat there across the table, and Breden was weakened by a quick surge of emotion that caught him unawares. And he could not quite analyze it. It boomeranged back, that wave of —anger?—and left him weak and at a loss.

"I've got to catch a plane," he said abruptly.

Louis stood up. "All right, kid," he agreed. "Give my love to Margaret. And—give me a call any time you want, will you?"

"Sure," Breden said. He left Louis at the door. After he had gone a few steps, he stopped, turned, and watched the mutant mingle with the crowds on the sliding ways.

What next? He tried to make plans. But his thoughts jumped ahead to the time when he was due back at the Pacific island. Then he knew what troubled him most immediately. He was afraid of night. He was afraid of the recurrent dream that night would bring.

Maturity brought its own problems. He sat in the televisor booth and watched directory pages sliding across the screen. As a child,

there had been no responsibility. He wouldn't want those days back, of course; maturity has its compensations, and security had to be earned. But that hard-won safety was slipping from beneath him. And there was no anchor, no dependable refuge, no one to whom he could delegate his problem. For the fault must lie in himself, and it was perhaps a very serious one. He could not go to the proper medical authorities and lay his vague story before them. They would sympathize and do their best to cure him, but they would also remove him from his post. They would have to do that.

What about Mike de Anza?

Mike had been close to him since their university days; Mike, too, had become a nuclear physicist. They still saw each other often. And Mike would be highly curative. He was a chubby, blond, wide-eyed man with an unquenchable enthusiasm for practically everything, and a deep sympathy for any of his friends who might need help. Mike de Anza might be able to suggest something. It would be safe to talk to him, anyway. And that was a vital factor.

Relieved, Breden placed the call. But de Anza was out, and no one knew when he would be back.

Then—Margaret?

No. He couldn't dump his trouble in her lap at this time. Louis was not the one; he had tried that already. Carrie Kohl—*no!* Who, then?

Nobody. Nobody he knew.

Well, what about somebody he didn't know? What about Springfield? It had been twelve years since he had seen the old physician. And Springfield *was* unorthodox, so much so that he wasn't held in high esteem by the medical authorities of GPC.

The pressure was unendurable. He had to talk to someone. Make it Springfield, then.

He made it Springfield.

Dr. Sam Springfield lived in the suburbs. He was seventy-three, a gaunt, white-haired man with wrinkled, drooping eyelids and liver-spotted hands. The neighborhood was as shabby as was permissible. There was only one nurse, who also served as receptionist, a tired-looking woman with unlikely auburn hair.

She announced Breden and went out. Breden shook hands with the old physician, sat down in a comfortable plastic chair, and presently was smoking. Springfield looked at him.

"Sedative cigarette," he said. "Why, Joe?"

"That's what I want to talk to you about. But it's got to be highly confidential. First I want your promise that you won't pass this on to anyone. I mean *anyone.*"

Springfield blinked. "What have you been up to? Murder or treason? Let me try your pulse."

"Not just yet, please. There's time enough for that later. I mean this, Doc; I hold a responsible position, and if I'm not in perfect health, I'll be fired."

Springfield said, "I know what position you hold. I see Louis occasionally. But he never told me you were ill."

"I . . . I'm not, physically. The medics at the base would have caught anything like that."

"Mental?" Springfield said.

"You've done a lot of psychiatric work, haven't you?"

"Not so much lately. I'm getting old, Joe. I'm satisfied just to sit back. Anyhow, research is forbidden, except along conventional lines."

"Not *forbidden*," Breden said.

"That's what it amounts to, though, doesn't it? Ah, well. People are getting conditioned against research anyway. Well, what's bothering you? Hear voices or something?" Springfield laughed and lit a black cigar.

Braden said, "My work is to guard Uranium Pile One. Well, I've been having recurrent dreams. In my dream I detonate the pile."

"Uh. You do, eh? Well, go on."

"That's all."

"How do you feel about it, I mean? In the dream? Happy or scared? Do you wake up feeling better or worse?"

"Worse. I'm scared. Naturally."

"But you detonate the pile anyhow."

"It's like a compulsion," Breden said painfully. "I suppose it's easy to explain. The medics at the base could do it and cure it. But then I'd be fired."

"Funny word to use," Springfield said. "People don't get fired nowadays. We've got security. What would you do if they fired you?"

Breden hesitated. "I . . . don't know. It would be the end, pretty much."

"Yet you could be cured of this ailment, whatever it is, and go on into different work—along your own line, naturally."

"I suppose I could."

"But this is the only work you care about?"

"It's the most important work in the world," Breden said with violence.

"It is, eh? Why?"

"Well . . . it's obvious. After all, a uranium pile—"

"Just what's the nature of your work, if you can tell me."

"I can tell you some of it." Breden did. Springfield waved his cigar impatiently.

"You sit around and look at dials. But the machines—those robot gadgets you mentioned—they'd take care of any trouble, wouldn't they?"

"To a certain extent. They aren't intelligent. Some emergencies might arise that would necessitate trained human reactions."

"Well, let's make some tests," Springfield said, standing up. "Take off your shirt. Now—"

Finally he returned to his desk and made marks on a pad. Breden, zipping his open-necked shirt into place, watched the doctor anxiously.

Springfield said, "How's your wife, Joe?"

"Fine. We're expecting a child, you know."

"Yes, Louis told me. I had three of my own. Don't see 'em much nowadays; they're all married. However, a normal home's very useful therapy; it's a good environment. Why don't you take a long furlough from your work and stay with Margaret for a bit?"

Breden said, "No. They'd ask questions—there is something wrong, then?"

"You could call it that. Joe, I'm going to ask you something."

"Well?"

"How would you feel about going to your own medics at your base and telling them everything you told me?"

Breden stood up quickly. "No. It would mean—"

"It would symbolize failure to you: I know that. But I've found something extremely important. More important than either of us. I want you to listen to me now."

Breden said furiously, "I came here for help! This is confidential; you promised me—"

Springfield put his hand up to his forehead. He said, "Joe, please listen. You've been under—"

The televisor buzzed.

Automatically Breden glanced toward it. There was—

—something different about the room. A noise. A faint noise he remembered. The televisor was silent and blank. But Springfield lay where he had fallen across his desk. It must have been the noise of his body thudding softly down. That was it. Yes, that was it.

"Doc!" Breden said urgently. He caught the man by the shoulders and lifted him back into his chair. There was no sign of breathing. Breden scarcely waited to check the heartbeat; he went hastily into the outer office to find the nurse.

The auburn-haired woman was gone; there was a smart-looking girl with sleek black hair and orchid lipstick. She looked up inquiringly. Breden said, "The doctor—I think he's dying."

Being a nurse, she knew what to do, and did it efficiently. She even enlisted Breden's aid to help her inject adrenalin directly into Springfield's heart muscle. But the doctor was thoroughly dead.

Breden said helplessly, "He was sitting there talking to me—"

"I believe it must have been his heart," the nurse said, studying the body with a practiced air. "He had angina, you know. The emergency medics will be here in a moment. I've called them."

Breden drew a long breath.

V.

The Freak said plaintively, "I don't want to think yet. I can't. The sutures are still open. Must I?"

Ortega said, "You must."

"Then turn the lights off. My head hurts."

Ortega dimmed the glow and the

Freak opened two of his eyes. He whined a little. "My head—"

Very carefully Ortega adjusted the flow through the tank that kept the Freak's head moist in its saline solution. The Freak said, "When can I get out of this thing, Rod?"

"Perhaps never. Not in my lifetime, unless—"

"It isn't worth it. It isn't worth it. Let me die."

"You don't mean that. You know what chance you have."

"It costs too much. That thing is coming up again."

"Your rational periods are much more frequent now the pressure's off and you're in the right condition. You'd have died in the sanatorium. I couldn't have tried these new methods there. Once you're back to complete sanity, things should speed up tremendously. But we can't wait till then."

"Oh, I don't care. My head aches."

"Even you can't wait. You'll be dead before this chance comes again, unless we take advantage of it now. We can't get what we need here. Equipment, yes, but not the power. We can't tap enough of it. It'd be noticed."

The Freak said wearily, "Well, what now?"

Ortega's gentle hands adjusted the temperature in the tank. "That better? Good. We had to move fast in New York this morning. We covered up, but handling Breden will be more delicate than we expected—and we knew it would be delicate. He's beginning to talk."

"Oh. And?"

"That's taken care of. However, Breden's on duty tonight again, and then off for a week. I want to know if we can make him move tonight."

The Freak stared into the darkness, considering. "No, we can't. It would be fatal. He isn't ready. The conditioning is incomplete. We must work on his conscious as well as his unconscious, and that takes time. The shadows are—"

"Easy!"

"Yes. All right. It will be necessary to— Opening my head to give my brain more room was necessary but it lets the shadows in and they are hungry today."

"Easy. Stop thinking. Stop thinking."

But the Freak had opened his third eye and the darkness was no barrier. He whined, "They only want my type of brain. It's your fault. You didn't have to work with atomic radiation and they're chewing in fast reaching the— STOP THEM. STOP—"

Ortega snapped on a dim light and very quickly made a hypodermic injection. The echoing screams stopped. Sweat stood on Ortega's forehead under the smooth gray hair. His mouth was tight.

The monster lay still now.

After a while Ortega said, "Relax. Don't think. All right now?"

The Freak said, "Yes . . . yes. All right now, Dad."

"Just checking on the safety threshold," De Anza said, sticking

a blue-headed pin in the map and making a note on a chart. "Let me get this reading, Joe. Five minutes, huh?"

"I'll vise Margaret. Where—"

De Anza jerked his thumb toward a corner cubicle. Breden threaded his way through the lab and sat down before the screen. He had some trouble getting the Denver connection; there was a storm in the Rockies; but presently relays clicked over and a Medusalike wig appeared. Margaret's voice said, "Don't . . . oh, Joe! What a time to call me! June, where's a towel or something, quick!"

Breden said, "You look gorgeous."

She was winding an improvised turban around her head. "Not when I'm getting a permanent I don't. There. I look a *little* better. Where are you, Joe?"

"Manhattan."

"Oh. Business, I suppose. Do I see you today, or do I have to wait till tomorrow?"

Breden said, "I don't know. If I can wind everything up today, I'll be completely free this time next week. I'm up at Mike's place now."

"Say hello for me. Everything fine?"

"Fine. What about you?"

"A little pregnancy never hurt anybody," Margaret said. But Breden looked at her closely. She seemed tired. He felt an intolerable aching desire to be with her, to ask for a furlough and forget everything but Margaret. Only he knew that while he could get the furlough, he couldn't get forgetfulness. One thing modern technology hadn't perfected was bottled Lethe.

"Well, don't change your plans. I'm not sure if I can make it."

"I haven't any plans. I'm just being lazy. Oh, all right, June. Joe, my hair is being toasted by induction or something and June says it'll fall out unless she works on it right away. I'll be back at the lodge in an hour. Call me then —if you can?"

He said, "All right. I'll see you." The screen blanked, but Breden sat staring at it for a while. Then, moistening his lips, he went back to De Anza, who was gloating over his map.

"How's Margaret?"

"Fine. She said hello. Did you figure out your thresholds?"

"Yeah," De Anza said, yawning. "It's only routine. Some big shot found a building site on Hilo and I had to make sure the radioactivity wouldn't make the guy fall apart. The area's shrinking, but he can't build that close yet. I'll have to tell him to wait fifty years. He'll love that."

Breden sat on the edge of the table. "Have you heard anything about some people called Neoculturalists?"

"Not a word. Who are they?"

"They're in favor of interplanetary travel being reopened."

"Oh, that gang. I remember. I get 'em mixed up with Logicians Plus. *They* want government by machines, as far as I can figure out. If it isn't one pressure group, it's another, these days. They don't

do any harm. They merely blow off steam. It's a healthy symptom. What's your interest in the Neo-culturalists?"

"Louis mentioned them this morning. I'm not especially interested. I don't suppose these groups are significant?"

"Not a bit. They're harmless. After all, GPC—!"

They considered the paternal autocracy of GPC. De Anza yawned again.

"Anything new?"

"Idle speculation," Breden said. "I've plenty of time for that. Ever heard of unconscious mutation?"

"What's that?"

"Well—a mutant who doesn't know he's a mutant."

"Few of 'em did, till mental and physiological tests showed they were variants from the norm. Of course it was easy to spot the failures. But if a guy is born with an especially efficient stomach, how could you tell unless he got a bellyache and had a GI series? Hell, that's why they started to enforce the ten-year physio-mental check-ups."

"That's what I mean. Have those check-ups kept pace with the times? If I could prove to GPC that there's a real need for new types of checks to be developed, they'd permit research on it."

"Research!" De Anza said.

"Well, it's done occasionally."

"Not independent research, Joe. GPC controlled is all."

Breden said doggedly, "Call it a bee in my bonnet. But suppose you've got a mutation that's successful, but recessive in the unconscious. A Jekyll and Hyde business. The mutation remains latent until there's a need for it. Like a bee's stinger. It's extruded only when the bee gets mad."

De Anza said, "What sort of mutation would this be, anyhow?"

"I don't know. It's wonderful protective camouflage, though, isn't it? The mutation simply doesn't exist most of the time. Maybe not even the mutant himself is conscious that he's a mutant. Only his unconscious mind knows."

"An eerie theory," De Anza commented. "It evokes strange pictures. Got any proof? I thought not. Somehow I have a feeling you'd never be able to convince GPC there was need for research on the subject. What got you started on this? Louis?"

"Louis knows he's a mutant."

"But he's no freak. He simply has an abnormally high IQ. He's got more potentialities than most of us. His maturation period took a long time, but he caught up fast."

"Louis is fifty-two."

"That's a pity. If he were twenty years younger—" De Anza shrugged.

"Well, he isn't. You're no help." Breden reached for a narco-cigarette, thought better of it, and moved his shoulders uneasily. Suddenly he felt that he was wasting time. He and De Anza had little in common any more—though, up to a few weeks ago, Breden had not felt that way. An intangible wall seemed to have built

itself up around him, isolating him from everyone. If he could find out who was building that wall—

He left De Anza and went out in search of a public televisor booth.

Dr. Rodney Ortega said, "I told you not to call me, Ilsa."

The girl on the screen wore a nurse's uniform. She had sleek black hair and orchid lipstick. She said, "Breden's found the weak link. He's coming here."

Ortega grimaced. "It was too risky. I knew that. But we had to move instantly to protect Breden when he saw Springfield. Ilsa, if we can just get him past tonight's tests—"

"You've overstepped yourself. There's only one answer now. Let me tell him the truth."

"All of it?"

"Enough. He's got to be satisfied, or the psych-detectors at the island will catch him. His mind has to be camouflaged."

Ortega shook his head. "It would be too dangerous. If he should be caught, there's scopolamin. And then where would we be—if GPC found out about us?"

Ilsa said. "It isn't safe to let him go back to work tonight. He knows too much and too little.

Tell him the answers; that's the only way. But then seal his mouth."

"How?"

"With his Control. Mnemonic erasure."

"It's risky," Ortega said.

Ilsa said angrily, "You're getting senile. There's no other way. Unless the Freak knows the answers."

Ortega said, "He doesn't know, of course. But we can get the answers from him."

The woman grimaced. "He's a weapon we can't use."

"I think we can. I'm on the trail of what may be the right explanation. It will mean altering our plans—"

Ilsa said wearily, "Shall I go ahead, then?"

"I—suppose so. Yes. Get in touch with Breden's Control. But be as careful as you can."

She agreed and broke the beam.

He felt danger. He felt it in the commonplace familiarity of this apartment, like a thousand others in the city; he felt it in the too-ordinary attitude of the girl, her relaxed posture on the couch opposite him, her dark, friendly eyes, her quiet competence. She had struck the first false note. Why should someone like this work in the suburbs for an ill-paid physician like Springfield?

He asked her that.

"Suppose you tell me what's on your mind?" she said. "You sounded a little incoherent over the visor."

"I don't think Dr. Springfield died a natural death. I . . . I think I may have killed him."

Now her eyes widened in real surprise. Breden didn't look at her. His glance shifted up to the televisor screen above her head.

"I'm thinking of latent mutation," he said, and went on to explain the theory he had discussed with De Anza. But this time he gave it a personal application. Was it possible that he, himself, might be a latent mutant? And that the mutation could become dominant under certain conditions—and use supranormal powers?

"Springfield was trying to tell me something when he died. Miss Carter, what happened to the nurse who let me into the office today? She was gone when I left, and you'd taken over. I don't know why that seems surprising to me. It's the whole combination of unlikely factors, I suppose. I want you to tell me—"

"Why didn't you go to the police?" she asked.

Breden made an abortive gesture. Ilsa Carter leaned back, looking steadily at him.

She said, "You'd have found out that Springfield's nurse had had an accident on the Ways. She was killed. It's unfortunate, but we had to move rapidly, and couldn't maneuver her out of the way fast enough. She saw us kill Springfield."

Curiously, the first emotion he felt was relief. *They* had murdered Springfield—whoever they were. That was better than—

He stood up. Ilsa Carter raised her hand; there was a shining silver disk, like a compact, in her palm. A tiny lens watched him like an eye. She said, "Sit down, Breden. I'm going to explain. But I could paralyze or kill you with this—it's what killed Springfield."

Breden sat down. "You'll kill me anyway," he said.

"No. We need you. We chose you because you're perhaps the only man in the world who's in a position to help us. And you're the right man. That combination may not occur again for a long while. Now . . . here it is. We're an underground organization dedicated to a certain purpose."

"You're the Neoculturalists?"

She smiled. "Oh, no. We've never bothered with names. The Neoculturalists and all the other groups are harmless—so far. Harmless to GPC, I mean. But we're not. We want to overthrow GPC."

He leaned forward slightly. Ilsa Carter turned the disk so that the lens flashed glitteringly. Breden relaxed.

"There aren't many of us," she went on. "But so far we've managed to keep our existence a secret."

"I don't believe you," Breden said. "GPC—well, you can't keep secrets from GPC."

"You are," Ilsa said. "They don't know about your dreams, do they?"

The earth moved beneath him. That shivering instability came up again, mingled with the heartbeat of a machine six thousand miles away. He wondered if the mind, too, could reach critical mass, and whether it could survive that level. He didn't think so. He looked at the visor screen and thought of Margaret. That was an anchor to sanity.

Ilsa said, "We want to overthrow GPC because we think that's the only solution."

"Solution to *what?* The world's safe—"

"So is a patient in cataleptic stupor," she said. "Do you know what has stopped civilization in its tracks? It was an omission. It was something that didn't happen, but should have happened, for the sake of the world."

"What?"

"The Third World War," she told him flatly. "It should have happened, a hundred years ago. But, since it didn't, we intend to make it happen now."

It was obscene. He sat there and looked at her. There was nothing he could say. His conditioning had never covered stark insanity. She seemed rational. But she wasn't. She couldn't be.

She sounded rational.

"I'll tell you about myself later," she said. "I'm a malcontent, naturally. That isn't important, except that all of us, in the organization, are malcontents. We have to be, or we'd never have formed it or joined it. It's our way of keeping a balance, staying sane."

"Sane!" Breden said.

"I hope you don't think you're sane," she remarked. "Oh, you're well adjusted to this world, but—it's a psychopathic world! The only satisfied people on earth now are the drudges. Like your friend Carolyn Kohl, at the island. She's satisfied to watch lights and push buttons. But her type of technician is in the minority. A man doesn't take up technology, usually, unless he's got an itch. And that's a hard itch to scratch satisfactorily—impossible, under this set-up. The result is stagnation."

"But safety," Breden said, vaguely surprised to find himself arguing. "An atomic war—"

"Would be a tangible we could analyze. One thing GPC has overlooked, Breden. This planet isn't isolated. It isn't safe. It is now, I suppose, but eventually—GPC may be surprised to find it isn't alone in time and space. We've reached the planets, yes. But what's beyond? Do you suppose there's no life, no civilization, equal to ours in the entire Galaxy?"

"They'd have communicated—"

"The Galaxy's big," Ilsa said. "Time and space are big. One day a ship may come in from outside, and—under this set-up—we'd have to attack it to maintain our isolation. That might be just too bad for us. Personally, I'd be glad to see that day come. But I don't want to wait for visitors from interstellar space. A race can die of dry rot, too. A race can go mad. Since GPC took over, humans have been forced into an alien social and psychological pattern, and most of the race is insane. It isn't recognized, because it's become the norm. It isn't incurable. But shock therapy must be used by this time. All progress has stopped. You can say that the *status quo* can be Utopia, but that ignores the fact that men grow. No one can be sane unless he uses his full potentialities. Even a moron must do that."

Breden said, "But you're the one who's insane. Don't you realize what an atomic war would mean?"

Ilsa looked at him oddly. "Yes, Breden. I do. Because I've seen it, and seen its results." She frowned a little. "There was a mutant born, apparently insane—*dementia praecox*. Hard radiations had mixed up his genes plenty. By rights he shouldn't have been viable at all; he was premature, and reared in an incubator for months. His father is one of our leaders. Eventually we discovered that this freak has a certain mutated power, a natural talent, that had been born into him. It's rather an unknown factor even now. Call it prescience, though it isn't exactly that. He can see into what seems to be the future, and in his rational periods he can tell us what he sees. That's how we got this weapon"—she raised the shining disk—"and other things. We have certain televisor attachments that enable us to keep underground. The Freak has described to us what he sees in this future world—if that's what it is. And—it's closer to Utopia than our world. We've called it Omega, for

definitive purposes. Though it's a beginning rather than an end."

Breden said cautiously, "If that's the future, what can you do to change it? If you act now, you may be warping the future away from your—Omega pattern."

"Or our actions may have brought about that pattern," she said. "I don't know. There are variables we don't understand; the Freak has told us things that don't fit at all—but one thing *is* clear. There'll be a Third World War. The result will come very quickly. It will be blitz, with modern technologies. There'll be an atomic holocaust, the nations will decentralize immediately, and there'll be bacteriological warfare. Not many people will remain alive on the planet. But research will be given the greatest impetus since World War Two. In Omega, Breden, the life span is two hundred years. And there are very few pathologies—the people are healthy. They live to their fullest potentiality. Scientists, artists, farmers—the boundaries are removed for them. They are reaching out to the stars. For their great men don't die as soon as they've achieved mastery of their professions. Their mutants—well, maturation's slower with mutants, and in this time-era they simply don't have time to reach their peak. But in Omega there's no senility at the age of seventy. And there's no o b s o l e s c e n c e through disuse!"

"Yes," Breden said. "I see your point. I don't agree with it. You can't survive without GPC."

"Conditioning!" Ilsa snapped. "You've been made to believe that! Why do you suppose we've been giving you that recurrent dream?"

"You . . . *what did you say?*"

"Dr. Springfield was about to tell you about that," Ilsa said. "He'd discovered you'd been under hypnosis—posthypnotic suggestion. You see, you've been conditioned too well. We could never hypnotize you into setting off the uranium pile. But we could make you dream you were doing that, as long as you *knew* you were dreaming. It was a preparation of your unconscious for what your conscious mind wouldn't accept without groundwork. We can convince your conscious that we're right—but we couldn't have done it two months ago. If we hadn't begun to change your ideas and your thinking already, you wouldn't be sitting here now. Two months ago you'd have reacted instantly by jumping at my throat."

Breden kept the tight control on his mind and body. He said, "You can never set off the pile. There are too many safeguards."

"You could set it off, though. As one of the nuclear physicists in charge, you could make an opportunity."

"I could. But I wouldn't. You couldn't hypnotize me into doing that."

Ilsa said slowly, "Of all the key physicists in the world, you're the only one who *can* be convinced. We did a lot of checking before we decided on you. Psychologically

you're the right subject. Here's what you're going to do. Return to the island tonight, stand your guard duty, and then, tomorrow morning, begin your furlough. During that furlough, we'll convince you that you must set off the uranium pile. When you go back on your job—you'll do that."

Breden said, "Unfortunately I'll be eliminated as soon as I take the psych-tests tonight. The psychologists—Medical Administration—will find out all you've been telling me, even if I wanted to keep it secret, which I don't."

"They won't find it out. I had to tell you this, because you'd begun to suspect too much. There were too many questions in your mind—unanswered questions. The psych tests would have detected something haywire if you'd gone back to the island without getting your questions answered. But now you know the truth; you realize you're not a mutant, and the danger is one you feel able to understand and cope with. As for your talking—you won't talk. You'll forget all this, until tomorrow, when your Control tells you to remember. That will protect you and us, when you're at the island."

"My Control?"

"The one who hypnotized you. Who suggested your dreams. The one who gave you mnemonic amnesia, through the televisor, in Springfield's office when I had to kill him. You see, Breden, we're quite ruthless. We prefer not to be, but we will take no chances. It may be a risk letting you go back to the island tonight, but it's a risk we must take, for we need you, and we need you in your present job. So you'll forget this interview. Your mind will be at ease, but you won't remember that your questions have been answered. I don't think any psych tests can get through the hypnosis your Control will work on you."

She had turned her hand so that the lens wasn't visible. Breden edged forward slightly. He drew one leg back a little.

He said, "My wife's having a child soon. I don't want to have him born into a world of atomic warfare. You may be perfectly convinced you're right, but I say you're insane. So—"

"Unless your son—or daughter—is a moron, he or she will be insane, growing up in this GPC-controlled culture. Wouldn't you rather have your child growing up in a world where he'd have freedom from disease, mental freedom as well, and a life expectancy of two hundred years? Breden, if GPC hadn't choked off the Third World War before it started, medical research would be a thousand years ahead now. Disease would be almost unknown—"

The voice came from the televisor screen. For a blinding second Breden didn't believe what he heard. Then a glance showed him what his mind could not accept: the face of Margaret, his wife.

She said, "I'm sorry, darling. It's something I had to do. I

stopped arguing with myself a long time ago."

Breden looked at her. "You're my . . . Control? You hypnotized me?"

"Yes, Joe."

"And you're in this . . . this organization of criminal lunatics?"

"Yes, Joe. But you'll have to learn more about these—lunatics before you make your decision. They're the only people in the world today who have transcended their barriers. They're limited, of course—it's hard for them to tap power-sources without detection. But in physics, chemistry, medicine, bacteriology, they know things this civilization doesn't."

His mouth moved stiffly. "Margaret—" he said.

Her eyes were steady. "For example . . . no, I want to tell you this, dear—"

Ilsa said warningly, "Now?"

"Yes. Listen, Joe. Medical Biology gave me a clean bill of health. As far as they were concerned, I was perfectly healthy. But our—organization of lunatics—has tests and reagents GPC never heard of. It will be years before it will show enough for Medical Biology to find it, but . . . but I—"

Ilsa sat stiffly, her eyes hard and bright. Breden stood up abruptly. He walked toward the televisor.

"What is it, Margaret?" he asked.

"Carcinoma."

Breden said, "Cancer . . . *they're lying!*"

"No. They're not lying."

"This early—it's curable—"

"Not with today's medical science. No germ or virus research is permitted. You know that. On the Omega future-world, cancer can be cured. But the Freak can't tell us how. The techniques are beyond him. He can't look through a microscope there and tell us how to culture an antibody. The cure must be found here on earth, in our time. I'll be dead, probably, before that, but our child will inherit a propensity for cancer. I'd like to know, before I die, that even carcinomatosis, no matter how virulent, can be cured."

"Margaret," he said, and stopped. She nodded slowly.

"There's the child, Joe. And there's the idea that you might have had cancer yourself—or something else that's incurable so far. I'd give you euthanasia if you needed it, you know. So I can't hesitate now. It's because—"

If she finished, Breden never knew it. The world drowned for him in white silence.

The whiteness and the silence receded suddenly.

He was on the jet plane, heading westward, far above the Pacific.

The ship shot in pursuit of the setting sun. Breden wondered idly how he had spent his time after leaving De Anza. But he did not wonder for long. Memories of a theater, of dinner, floated up from somewhere in his mind.

He thought: *After tonight's stint, my furlough. I'll spend it with Margaret. Maybe I'll get away from those dreams.*

I mustn't let Medical Administration find out about my dreams!

Ortega said irritably to the televisor, "I'm extremely busy, Ilsa. There's a new development with the Freak. I don't know what to make of it."

"This won't take long. It's important. Breden's brother, Louis, and a physicist named De Anza—they compared notes today and started asking questions. They're coming up to see me. We can't kill them, you know. It would cause too much uproar. There'd be an investigation. We couldn't cover."

"We'd have to kill them."

"Ortega, they'd fit in Omega. Both of them. With a lot of reconditioning—but they're brilliant men, especially Breden's brother. He's a mutant, you know. If there's any other way possible, I think we should avoid killing them."

"We can't afford investigation at this point. Breden must stay at Uranium Pile One."

Ilsa said, "Well, his Control hypnotized him, and he went back to the island. He's still worried about losing his job. So he won't talk about his dreams. As for the rest, he's forgotten it. It'll have a chance to germinate in his unconscious. Tomorrow he'll remember, at the right time, but by then we'll have him under our wing. It won't be as easy as we expected to convince the man. There's intense rivalry, of course, between Breden and his brother—" She paused. "Wait a minute. I've an idea. I wonder if there isn't some way we could play on that rivalry to push Breden in the right direction?"

"That isn't the strongest card we hold."

"He knows his wife has cancer," Ilsa said. "That emotional appeal may turn the trick in itself. Or it may not; I don't know. But we've got to win him to our way of thinking before his furlough's up. When he goes back to the island, he must set off the uranium pile."

Ortega said nervously, "Ilsa, please do the best you can. I'm on the trail of something completely new with the Freak."

"You're curing him?"

"It isn't that. It's . . . I'll tell you later, when I've found out more. But—the Freak's mutated talent isn't prescience. It isn't the future he sees."

Ilsa stared. "Omega isn't our future world?"

"I don't know what it is," Ortega said. "But I suspect we're going to find out."

Six hours later Ortega was still working on the mechanism. He didn't know what it was. He followed the Freak's orders. The Freak lay motionless with all his eyes closed, moving a little occasionally in his tank, and sometimes merely resting passive, saying nothing. The rational period was unusually long. It was wearing, however, and twice the Freak, nearly sick with nervous exhaustion, began to cry.

But the mechanism grew nevertheless.

This had never happened before. The Freak had described what he saw in Omega—and sometimes what he saw was completely paradoxical—but he had never dictated a blueprint to his father. He seemed to be watching a similar machine being constructed somewhere—on Omega?—and describing its progress, so that Ortega could duplicate it step by step.

"Power," the Freak said, after a long pause. "Give it power."

Ortega made a connection and moved a rheostat. The Freak said, "More."

Presently—"More. Much more."

Then: "More than that."

Ortega said, "I don't dare. We're tapping too much as it is. We'll be detected."

"It takes more. He's trying—"

Ortega moved the rheostat again. The Freak said, "It's different now. Funny. Savages, they look like. They're chasing a . . . it looks like a bison."

"Savages?"

"Wait. I've got the machine again. More power. More—he keeps motioning for more."

Ortega clenched his teeth, and, with an apprehensive upward glance, threw in another switch.

Suddenly a voice boomed through the room.

"Hello. Hello. Can you hear me? Can you hear me? Hello!"

Ortega said, "I can hear you. Where are you?"

"Can you hear me? Hello?"

The Freak muttered, "Shadows are coming. I can't . . . no, I can't—"

"Hello! Your mechanism is incomplete. Or it needs readjustment. I can't get in contact with the rapport mind now—"

"Shadows. Eating. I want—"

"—trying to reach you. We can help you. We know some of your problems — we've learned them through your rapport mind—the mutant. We have atomic power—it's controlled, and we want to—"

"Shadows coming . . . I don't want . . . my brain is open . . . no, no, I don't want—"

Sweat showed on Ortega's cheeks. He glanced from the monster to the machine, and back again.

The voice roared out: "Some adjustment necessary before we can talk—I can't hear you. What's wrong with your rapport mutant? He isn't reaching us."

"The shadows—"

"We have atomic power. We can help—"

"All right now. I can see Omega again. Or . . . no . . . it isn't—"

"—atomic power—"

"WHERE THE EARTH SHOULD BE . . . WHITE, WHITE, BLAZING . . . LIKE A SUN. IT WAS THE CHAIN REACTION—IT MUST HAVE BEEN—"

"—help you release atomic power—"

"—IT WAS THE EARTH ONCE! IT WAS THE EARTH!"

TO BE CONCLUDED.

BY HARRY WALTON

HOUSING SHORTAGE

The owner of the house was really doing everyone a good turn. It wasn't his fault that the apparatus slipped just a trifle and surely anything that would make one house serve four families was a fine idea.

Illustrated by Cartier

"It's not an ordinary sort of house," the skinny man said. "Not exactly a honeymoon cottage, I know. But then, I built it to suit myself."

"It's divine," said Josie. "Besides, our honeymoon is over. We'll take it."

Of course we would. The place was roomy, comfortable, and—for these days—a steal at the rent asked. But I had to act as if I had *something* to say about it.

"Just a minute. You're offering it furnished, but what about this in the ad—'no radio'? That means there's none in the house, or you won't have one brought in?"

The skinny guy, who'd said his name was Professor Dalrymple, turned his bifocals back on me.

"I have no objection to radios. But there is a good reason why I have not included one in the furnishings. It would be inoperative."

"Huh? Oh, it wouldn't work? Why not?"

The professor sighed. "If I knew that, Mr. Gates, I should have solved one of the great mysteries of the electromagnetic spectrum. The skip phenomenon is known to every radio engineer. My house seems to be in a blind spot so far as radio reception is concerned. You would be unable to listen to your favorite programs—or any others."

"No singing commercials?" I cracked. "We'll take the place. Say, why the high fence along the driveway outside?"

"To insure myself privacy," the professor explained. "Since I may some day wish to live here again, I can rent the house only on condition that the fences—and other things—be left exactly as they are."

"Sure. Sure." The fence meant nothing to me. We weren't renting the place to throw garden parties, and three months of house-hunting had pretty well worn the edges off our choosiness. But Josie, womanlike, had to have the last word after I was ready to sign on the dotted.

"Please, professor," she wheedled. "Can't we have real . . . I mean plain glass . . . windows just in a couple of rooms. If we buy the glass, and Joe puts it in?"

I started to nix that. As a handy man I'm all bruised thumbs. But the professor rallied around faster than I could.

"The windows must remain just as they are. My own tests prove that transparent windows distract the attention and injure eyesight by excessive glare. The house being air-conditioned, it is never necessary to open windows, while the translucent panes admit ample light."

He rattled it off like reading from a book—or saying something he'd had lots of practice saying.

"But a woman wants to look out of her home," Josie began a flank attack. "It's so cozy to look out when it's raining outdoors."

The professor blinked behind his glasses. "I appreciate the sentiment, and I do hope you will feel under no obligation to rent the house. It will be easy to repeat my advertisement in tomorrow's—"

"Don't bother. We'll take it right now," I said, stepping delicately on Josie's number fives. We were all standing on the front step, and I'd just spotted another car pulling up.

"Of course we'll take it," she gasped. "I really don't care about the windows. Not a bit."

We signed the lease right there, before the other house hunters came close enough to show the gleam in their eyes.

The professor wasn't kidding when he said a radio wouldn't work. I had a battery portable Josie'd given me one Christmas, so the first chance I had I unpacked it and put in new batteries. Not a peep. I walked toward the door with it, and just as I got past the bend in the

vestibule it broke into the tune of "Onezy Twosy." Two steps back, and it quit dead.

"Hey, Josie," I yelled. "We can have a radio, if we hook it up in the vestibule and turn it up loud."

So I did that—left the portable turned on in the vestibule and stepped back into the living room.

Quiet. Just like that.

"Fine time for it to quit," I squawked, walking back.

"Threesy, foursy," came back the portable.

I jumped a foot—backward.

Dead silence.

"The acoustics in this place," I announced, "are out of this world."

But I didn't know what I was talking about then.

Windows are things you expect to look through. But ours were frosted; light could come in, but you couldn't see out. Josie said they got on her nerves, and nagged me until I tried to open one.

It couldn't be done. The frames weren't made to slide. They might as well have been solid with the walls. But the air conditioning was fine. We really had no more use for an open window than Gypsy Rose Lee has for a whalebone corset.

The house stood on about an acre of ground, but there were so many trees and hedges you never saw all of it at once. In fact, the professor had fixed things so you couldn't walk around a corner of the house. One iron fence ran along the driveway from the road right up to the north corner, and another fence like it stretched from the east corner until it lost itself in more trees. There were hedges behind hedges. I figured the professor sure did like privacy.

"Joe," the wife said a few weeks after we'd moved in, "I don't like it."

"Among other things, what?" I came back, trying to read the newspaper.

"Well, I'm not sure."

I laid the paper down. This from Josie was like Comrade Stalin saying he wasn't so sure about Communism. What Josie likes and doesn't like, she knows.

"Well—the neighbors, for one," she said when I kept looking at her.

"Best we ever had," I came back. "Never borrow sugar, don't beg for rides, have no dogs, throw no late parties, and best of all don't live near by. That makes them ideal neighbors."

"Well, I heard them."

I picked up the paper. "Josie, they've got a right to make a little noise in their own yard, even if you are walking by."

"But I wasn't."

I gave up trying to read. "Look, Love, are we talking about the same thing? The nearest house is half a mile away. You couldn't hear anything less than a boiler explosion from there. With that fixed in mind, let's start over."

"I heard them," she said.

"O.K. O.K. Who and where?"

"Don't know. A woman and a man, out on our front step."

"Now it makes sense. Did you ask them in?"

"They weren't . . . oh, Joe, you're mixing me all up. They weren't on our front step. I was, when I heard them."

"Then *they* must have been passing by, although you've pretty good ears to hear them all the way from the road. It's two hundred feet away."

"*They* weren't," she snapped. "They were just . . . just like around the corner of the house. Anyway, close to it."

The Sherlock in me popped up. "Then there must be a short cut behind all those trees and things, back of the house."

Josie shook her head.

"Why not?" I yelled. "And why get excited about it anyhow? What were they talking about, murder and arson?"

"No. First he said, 'Good-by, Honey.' And a few seconds later she called out, louder, 'Bring some butter back if you can find any.' And he called, still louder, 'Sure will . . . if.' As though they'd been together and then he'd gone off."

"And that's your mystery?" I asked. "Simple. You heard this, I'll bet, between eight and eight-thirty in the morning. I will also deduct, like a detective, that they are probably husband and wife, and that he was just leaving to go to work."

Even as I talked I felt something didn't fit, that I was the one talking nonsense, not Josie. I looked at her. She looked at me.

"And then, children," she said, "the lady went back inside the magic oak, and shut the door."

"You win," I admitted. "It's not the right dialogue for a short cut across lots. Unless, of course, she was walking part way with him. That could be it."

"Of course," said Josie. "And she must have brought the door with her. Because I heard it slam."

Josie didn't mention the neighbors again, and I made a resolution to go around the hedges some Sunday and find the short cut. But the first week we went to the beach, and the next it was raining, and after that it didn't seem important.

It was raining this Saturday night too, and I got in dripping wet and hungry.

"What're you cooking for the man who brings home the bacon, Love?" I asked, barging into the kitchen.

It was spare ribs, which I like. But I was wet and wanted sympathy.

"You're lucky you didn't have to go out today. Look at me, soaked to the skin while you don't even know it's raining."

She gave me what was a dirty look in any language.

"Don't get sore, Love. I'm glad you *are* comfortable. Just feed me and you'll find me tolerably human."

"I'm not sore," she said in a tone of voice that said she was. "And I'm glad you think I'm comfortable, for I don't."

"But why not? The place is as comfy as you could ask, the air conditioning's perfect, it's dry and warm inside. Why, you'd never guess it's pouring outside."

She gave me a queer look. "No,

you wouldn't—today. I hope it clears up tomorrow. Now come and sit down. Dinner's ready."

But it didn't clear up. The moment I woke Sunday morning I knew it was still raining. Up on the second floor you could hear it plainly—on the windows, on the roof, on the gutters. I rolled over for an extra snooze, but Josie had other ideas.

"You promised to drive me to Madge's and play golf with Henry while we two visit. Remember?"

"In this weather? Have a heart. No golf in this rain. Make it next week."

"I will if it's still raining when we leave," she agreed. "But you've got to get ready."

I argued, but took the count. All the time we dressed and had breakfast it rained, but loud.

"Funny we couldn't hear it last night," I said. "Anyway, Henry and Madge won't expect us."

Josie smiled the way the Mona Lisa does.

"Remember you promised to play fair. Dress as though we *are* going, and if it's still raining when we step out the door, we stay home."

Grumbling, I dragged out my raincoat.

"Be logical," said Josie. "If we go, you won't need that. Just take your clubs."

We must have looked silly, standing there in our sunny Sunday morning best, with a bag of golf clubs and she in a flowery dress that looked as if a heavy fog could wash it away, while all around us the rain played drumsticks on the house.

"Listen to it come down," I said. "You're not going to see this through to the bitter end, are you?"

She smiled like a little girl who knows a secret. I walked angrily to the door, opened it, and went out. At first I didn't see anything but the half-bitter little grin on her face. Then it hit me.

It wasn't raining. Old Sol was blazing out of the kind of blue sky they write songs about. The world looked as though it had been washed, starched, and thoroughly dried.

When I came to I laid down my bag of clubs and went back inside. Rain. Rain beating against glass. Rain on the roof. Hissing, pattering, thumping, noisy rain. It was a sound I'd have sworn could be nothing else.

But I went out again, locked the door, and picked up my clubs. "Darned funny," I admitted. "Must be something wrong with the air conditioning plant, and the noise gets piped all over the house. Sure funny how it sounds like rain."

Josie looked at me, grinning a little like somebody who doesn't think things are a bit funny.

"You're a sweet liar, Joe," she said. "But it *is* rain."

I lost all nine holes to Henry, thinking about it.

There was nothing wrong with the air-conditioning equipment. I went into the basement that night and looked at it. It was a big, box-like affair, all housed so thoroughly there really was nothing to see. But

it made only a low, humming sound. The rain noise had stopped by the time we got back, so my snooping didn't prove anything. Maybe the machinery went out of whack just occasionally, and was on its good behavior again.

That's what I finally sold myself.

Somehow I didn't want to go to work next morning, but rather than argue with Josie—and my boss—I went. What I did manage was to get home early, while it was still daylight—late afternoon of a sunny, clear day.

And the minute I got in the house I heard it again. That sound that couldn't be anything but rain pelting against roof and windows. I kissed Josie without concentrating, and as soon as she went back to the kitchen I ducked downstairs.

No noise, No soap.

But I noticed something else, something I wasn't looking for, something that sneaked up on me.

I'd been all around the air conditioner, seen it from every side. And nowhere was there a switch, a fuse box, a manual control, a shutoff dingus. Three or four thick BX cables came out of the concrete wall and floor and ran into the gadget. No controls.

A week before I wouldn't have given it two thoughts. The thing ran fine. It needed no attention. It was fixed so you couldn't monkey with it. So what?

Only that things aren't built that way. Even automatic machines aren't fixed to run *regardless*. They've always got some gimmick you can shut them off by. Even the fixit man has to turn off the juice somewhere. But this gadget had nothing, and I had a wild idea, suddenly, that any serviceman would tear his hair if asked to fix it.

It was still raining—with sound effects. I had to get closer to the sound, from inside the house.

"Now don't go away again," Josie called as I started up the stairs. "Supper's almost ready and I don't want it getting cold."

But nothing could have kept me out of the attic just then. Nothing but the hatchway door. There was a square cut out of the ceiling in one bedroom, and a panel closing it—the kind that usually lifts up. Not this one. After I found the screws set in the edges I got the six-in-one combination tool I keep in my dresser drawer—because it's strictly useless where you really need tools—and got out the screws. Then I lifted the panel and hoisted myself up.

They say if you think you're crazy you're sane as they come. Which was reassuring just then, because I thought I was nuts until I remembered that. For up here it was raining—but hard. It was rain on the roof. The kind of splashy, spattery, hard-driving kind of rain that sounds like what it is and nothing else.

Maybe I'd expected it. Maybe if I hadn't found it I really would have gone goony. But finding it didn't answer anything; it asked a thousand questions more, all whispering at me from out of the darkness. There were no attic windows; it was pitch black except for a little

round dot of daylight up under the ridgepole at one end, where maybe a shingle had fallen off.

So I threw my flashlight around, having brought it just in case. It showed me an ordinary, run-of-the-mill attic, with the look all attics have. But what didn't belong was the network of wires that ran all around, up and down the rafters, crisscross at both ends, and into two BX cables that ducked back into the floor.

And before I could think myself out of that, there was the other thing. Another six inches to one side with the torch and I'd never have seen it. I wish I hadn't. Because I'll never forget it, and it isn't a pretty thing to remember.

A snake, and not a big one either. Not more than a foot long. An ugly, flattish head. Fangs an inch long that overlay its lower jaw so you could see them even when its mouth was closed. And wings.

A winged snake, lying there in the disk of light my flashlight threw. A *feathered* snake. Stretched out, the wings would have been eighteen inches across. It had no tail such as a bird has; it was all wing and body. Staring at it, I wondered if it balanced in flight by shifting the curve of its snake tail fore and aft. As if that mattered.

As if anything mattered but the crazy fact that this thing which didn't exist—which couldn't exist—lay dead at my feet.

Sure, I know that birds and snakes may have started from the same root way back, or so they think. But that's theory, and this was fact. It must have slipped into the attic through that hole where the shingle was missing, and then batted around in the dark, unable to find its way out again, until it died of starvation.

You think about things like that when you face the impossible. You explain the things that would be clear to a four-year-old, because that helps you think you've still got all your marbles. I even noticed that the rain wasn't coming down as hard. It was only a whisper.

Then a new sound—a slithering, scratching noise just outside the thin shingles. And suddenly a *smack*—sharp, impatient. And silence.

A thing like this, or bigger? A feathered snake, crawling along the roof, its wing slapping the shingles as it took off? Or something else, something that could claw off those shingles to get inside if it knew there was food to be had?

Why had the professor put blind windows all over the house?

I went back through the hatch and tightened the screws holding the panel as hard as they'd go. Then I changed my shirt to keep Josie from asking questions. It was soaking wet anyhow.

Next day I tried to find the professor. We'd been paying the rent to his bank. At the bank they told me he was traveling, couldn't be reached.

So I went home, very quiet. There wasn't a smell of supper in the place. No Josie in the kitchen. Nothing cooking. Something tight-

ened up inside me, because no matter what, Josie always has supper ready. Yelling her name, I went upstairs three steps at a time.

She was lying across the bed, dressed, as though she'd lain down for a nap and overslept. My nightmares about winged snakes ten feet long smashing windows to get in began to look silly. I woke her a special way we have, and she sighed a bit and came to.

"Joe," she said. "Oh, Joe, I'm awfully glad to see you."

"What's the matter, Love? Not feeling well?"

She sat up, not sleepy, but alert the way you are when you remember something you'd rather forget.

"It was a dream, Joe. A nightmare, I guess. It seemed so real—terrible." She shivered, but went on. "It seemed I went out to go shopping—I meant to today, you know. I got out of the house and as far as the azalea bush. But there wasn't any azalea bush."

"Call that a nightmare?" I kidded.

"No, but that made me look around. And—Joe, nothing was right. The sky, even. It was too pink. And our concrete walk wasn't there. Nor was the fence, nor the trees. It was just a big plain, ex-

cept for the mushrooms. At least they looked like mushrooms—big ones, all colors."

"Just like Alice in Wonderland. Which side did you eat?"

"Alice was a little girl. Joe, when a grown-up thinks she sees things like that, it isn't cute any more. It was if the world had gone all wrong. A pink sky, and mushrooms big as a table. Not just written down to be read about, but there as something real. And *I* was what didn't belong."

"It's still just a dream, Love," I said, wishing I could explain my feathered snake the same way.

"And you know how dreams are," she went on. "How you know you ought to run, or wake up, before something awful happens. But you don't. I knew I should run back in the house, but I didn't. I walked around, looking, and terribly afraid. Once something like a bee buzzed around me. Then it lit on a flower—a green daisy—and I got a good look at it. The thing that buzzed was a bird. A bird no bigger than my thumbnail, Joe."

And a snake with wings up in the attic, just a few feet away.

"The bird was beautiful, but it frightened me more than the pink sky or the mushrooms. I must have stretched out my hand, because it flew away. And then—I picked the daisy.

"Joe, that daisy was as big as a soup plate and green as moss—green petals on a red stem with red leaves. Picking it was like taking along part of a nightmare to wake up with. You see—everything seemed so real in the dream, I was afraid I was crazy. So I had to pick it to prove to myself, later, that I wasn't."

"O.K., Love. So you dreamed you picked it. And then?"

"I ran back to the house, and put the daisy in a vase, and put the vase on the piano. Then I ran up here and lay down, and was awfully scared. And I still am."

"Forget it, Love. You're awake now. Want to go out to dinner?"

"Joe, suppose I didn't—"

"Come on. It'll do you good to eat out."

"No, I mean suppose I didn't dream it."

"My aunt's foot! Go down and look on the piano."

She looked me right in the eye.

"Joe, that's why I've been waiting. *You* look."

My spine wriggled.

"Oh, sure," I said loudly. "I'll go look."

I got up and tramped downstairs, making plenty of noise. I went into the living room. There was the piano. There was the vase. And in it—

A green daisy, big as a soup plate.

It was hot that night inside the house, but we wouldn't have been comfortable anyway, so the fact that the air conditioner wasn't working right didn't register. Josie cooked a snack we hardly touched, and we went to bed.

We had a fight in the morning. Not about giving up the house—we'd agreed on that, but I wanted to take Josie with me, and come back for our stuff together later. But she

"just couldn't." There were so many things to pack, and curtains to take down, and she'd be perfectly all right inside the house. A woman's argument. So of course it won.

And not a word about what we were both thinking of all the time—what we'd see when we opened the front door.

Giant mushrooms or azalea bush?

You understand we had to make out like it was any other morning. Shave, dress for the office, have breakfast, kiss the wife, and put my hat on by the door, the door we didn't want to open.

But when I did, the world was pouring rain, rain that spattered on the leaves and dripped from every stem of the azalea bush.

The most wonderful rain on the most wonderful bush in the most wonderful world in all the universe.

So I kissed Josie once more, concentrating this time, and went out. Not knowing I'd wish I had knocked her cold and dragged her along. Not dreaming of the nightmare I had coming up.

I told the fellow at the bank, who was to collect the rent, that we were leaving. But I didn't tell him why.

"We don't like not being able to look out of the windows, and if we could, we wouldn't want to see mushrooms the size of a table. And there's a winged snake in the attic. It's dead, but we don't like it. Daisies shouldn't be green, and the birds are the wrong size, and neighbors who aren't there can be heard on our front step."

You see why I didn't tell him? I just gave notice and asked to see Dalrymple. But I got the same answer as the day before.

I couldn't find an apartment, but by great good luck the furnished room we'd left happened to be vacant, and I took it. Then I headed back to get Josie, whistling as I turned into the driveway. Who's afraid of the big green daisy?

But the trees screened the house until you were right on top of it, and before I saw it I knew I was really scared. Of nothing—and everything. Scared that the house mightn't be there, or that a feathered snake might be sitting on the azalea bush.

Instead, everything looked just as I'd left it. I unlocked the door because I knew Josie would be busy. Three steps inside, I felt my knees jellyfish under me.

Not that there was much wrong that you could see—just the furniture. It wasn't the right kind, and it wasn't in the right places, and to me that meant this wasn't the room I'd left a few hours ago.

"Josie!" I yelled. And other things, running from one room to another. All were different. Not a stick of furniture was the same. In the living room there was no piano, no vase, no green daisy. And no Josie anywhere.

I tore upstairs, still yelling. Something wrapped itself around my neck just as I turned at the landing. I clawed at it while it turned me around. It was a big, blondish man, dressed in the kind of uniform laundry drivers and delivery men wear.

"Gotcha now! What've you done

with Greta? Answer me or I'll break your neck."

"Where's Josie?" I squeaked between his ten fingers.

"If you done any harm to Greta—" he bellowed.

With that kind of talk we weren't getting anywhere. He saw it, luckily, and instead of choking me just shook me. He was that big.

"What's goin' on here? What's happened to my Greta?"

"Don't know," I gasped. "Never saw her. I left Josie here—"

He shook me again.

"Drop the double talk. You're here, ain't you? You got to know—"

From downstairs came the sound of a slammed door. He let go of me so suddenly I almost dropped. Then we ran neck and neck down the stairs, reaching the dining room in a dead heat.

It was a little fellow with a scrubby mustache, carrying a briefcase. He just stood and stared at us for a half a minute.

"I'm sorry," he said at last. "I guess . . . I guess I'm sick. Could somebody tell me how to get to 16 Bonita Road?"

"What you want there?" the big man asked.

"I live there," answered the little guy, looking around the room like he'd lost his way.

"What's your address?" I asked the big blond.

"Gravesend Avenue, and I ain't lost. Not till I got in here, I wasn't."

"Just around the next street from me," I said. "We're on Kendrick Road."

I had a feeling, but didn't know why, that the addresses were important. Bonita, Gravesend, and Kendrick were the three sides of a square. So what?

"I must be going," said the little man. "Helen . . . my wife . . . will be waiting for me."

"No you don't—" began the big fellow. But I put a hand on his arm, and we both watched little Milquetoast head for the kitchen. We followed him. When he opened the back door—there wasn't any in the house Josie and I'd rented—we could see a flagstoned walk and part of the row of maples on Bonita Road.

But he didn't go out. He turned around in the door and looked at us. Then he began to cry like a kid—big, gulping sobs that it hurt to watch. Slowly things began to click in my head; they didn't make sense, but what did? I took the little guy's briefcase away, led him to a chair, and put a glass of water in front of him.

"If you love your wife," I said, "don't go away."

The big guy tagged along as I went to the living room. There was a foyer leading off it that I'd never seen before.

"Is this the way you come in from Gravesend Avenue?" I asked.

"Sure. But something's phony—"

"Shut up. I'm getting an idea. Is this your house, with the furniture all wrong?"

He just nodded. My mind kept racing along a lot of blind alleys and back again to a house that belonged to three other people. I took time out to look around more carefully.

The furniture wasn't only different; it was thrown around where it would do the most good, regardless of looks. No woman would have arranged it this way.

I went to the old-fashioned desk, neat in a fussy sort of way, but not pretty. A bundle of pigeon-holed bills interested me. They were made out to James Dalrymple. One of them, for electricity, was up in the high brackets.

"What do we do now?" the big guy asked suddenly. "I don't care about the house. All I want is to find Greta."

The fight was out of him now that there was nothing he could lick into, and he answered questions in a willing, hopeless sort of way. They'd rented the house from an agent and lived here three months. Greta didn't go out much, but she wished you could look out of the windows. Check.

"You've been upstairs, and there's nobody there," I said finally. "So if the guy we want to see is around, he must be in the cellar."

We had to go back through the kitchen, so we picked up Milquetoast on the way. The door at the bottom of the cellar steps opened easily. There was another, locked, behind it. I knocked hard on it, but nobody answered.

"We ain't waiting," said the big man. "Out of the way."

He slammed his weight against the panels. On the fourth try the lock got tired and he went through, me right behind and Milquetoast trailing.

There was a bigger air conditioner than I remembered, ten times as many cables, and a panel board against one wall that should have been in an Edison substation. The air smelled the way it does after a thunderstorm sometimes, and in a far corner an electric arc spotlighted the figure of a man welding something to a mess of bus bars.

We three went up to him—and didn't do a thing. There was something about the way he was working—as if neither he nor we mattered—that stopped even the big blond guy. And then with a snap the arc went out, and the welder took the mask off his face. It was the professor.

"I've been expecting you," he said, sort of tired. "What time is it?"

I got it from a fancy sort of clock with four hands hung on the wall. "Quarter to six."

"I know what you're wondering," he said. "Your wives—I can promise two of you that they are safe for the present."

Something tight in my chest told me I was the third.

"We knew last night," I managed to say. "She won't leave the house. Will that help?"

"Yes. She's safe indoors so long as the house stands. The crucial time phase occurs at 6:22. Help me with this grid."

The big fellow helped me jockey the bus bars into position, and the professor showed us how to take out another set. We forgot all about Milquetoast. Later we wished we hadn't.

"You already know too much," the professor said as we worked. "You have a right to know the rest."

He fished three cables from somewhere and clamped terminals to them in a way that showed he'd had plenty of practice.

"I don't suppose you know anything of the structure of time, or that you've studied the brilliant theories of Dunne as given in his book 'The Serial Universe.' He suggested a second time rate or flow as being necessary to measure the passage of Time One, the time our clocks measure. Further, he postulated a third time flow to gauge the passage of this second time rate, or Time Two. And so on."

Remember the condensed milk can with a picture of itself on the label, and that picture having a smaller picture in it, and how you wondered where the thing would stop?

"The sequence is infinite," the professor went on, as if I'd asked him. "I cannot explain the new physics by which I was able to check Dunne's theories and later to measure the cycles and synchronization of several time states. I found each linked with its own three-dimensional space. I learned that the entropy of these regressive states was greater than that of ours, so that I could reach them physically and even reproduce material objects in them."

"Such as houses," I said. "You mean Josie's marooned in the past somewhere?"

He was pulling still another busbar grid from what I thought of as the air conditioner. It was fused as if it had been in a furnace.

"No! These time states are parallel. Your wives are in the present, but in regressive time states. To travel back through Time One would involve all the paradoxes pointed out in fiction, but to enter a regressive time proved all too easy. The drop in energy, the entropy difference, supplied the power. I had only to trigger the fall. The discovery was tempting, for I was short of money. Another man might have thought of a hundred ways to earn more with the means at hand. I could imagine only one."

"You sent this house into three different times," I said.

He nodded. "I needed it for myself, but if I could generate others like it, and gain an income to carry on my work, where was the harm in that? The shortage of housing space not only made it easy, but even seemed to justify it."

A slow shudder went over the big blond fellow. He looked at the professor strangely, while the hands that were holding the grid tightened until the knuckles showed white.

"Get her back," he said slowly. "If I don't get Greta back, I'll kill you."

It was the wrong tune just then. I knew that nobody but the professor could help us, and if anything had to be settled it ought to wait.

"One house, and four entrances," I said to ease things up. "Each hidden from the others, with fences between so the tenants wouldn't go visiting, or notice each other. Each

of us came home, stepped through a doorway, and into a different house."

The professor nodded. "Each entrance was a miniature time grid. You, for instance, entered Time Four whenever you passed through, and re-entered Time One whenever you left the house. The necessary equipment was housed with the air-conditioning unit, which was needed because I could not allow windows to be opened. The regressive universes are—unearthly. But inside the four walls all was normal."

"Until yesterday," I asked.

He nodded. "I take full blame. You can do what you like with me when we are finished. But the breakdown was pure mischance, not negligence, nor miscalculation. I overrated every part, allowed a great safety factor. It could not have been foreseen."

"What's it like—where Greta is?" croaked the big man.

"Strange, but not unpleasant. While the life forms are odd, they are not dangerous in either Time Two or Time Three. That is why I said your wives would be safe, as they will be even if—"

He looked at me, and I knew it was Josie who wouldn't be safe *if*—

"Finish it," I croaked.

"If we can't restore the full capacity of the time grid by 6:22," he explained, "the temporal extensions of this house will collapse. Remember that they exist only because *it* exists—in Time One. The bridge has been broken for nine hours. But I think we shall have the grid working in time."

We worked. At 6:12 the professor stepped back, turned up a couple of controllers, and stared at a flock of meters for what seemed an age. I didn't seem to breathe while we waited. Then he turned to us.

"The bridge is restored. You can go back upstairs and get your wives. Go out by the doorway you are accustomed to, then go back in."

I knew how they feel when the Marines arrive. I could have hugged the professor, even if he had shot six innocent people into three different hangouts of old Father Time. The blond guy showed it too, before he ran out.

And Milquetoast?

We'd forgotten him, the guy with the zero personality, the little man who wasn't there. But he had gone the color of ripe cheese, and was muttering something we couldn't make out.

"It's all right," I said. "You've got her back. Helen's waiting for you upstairs."

He stared at us with eyes that didn't seem to belong to him. When he talked, it was like chalk squeaking against a slate.

"She was always waiting. Until I came home. Then she argued. She nagged, until I couldn't stand it."

"She'll be glad to see you now," I said, talking as to a kid.

"She won't see me. When I couldn't go on any longer, I did something. This morning I killed her."

Just saying it seemed to stiffen him inside.

"She would never have believed I

could do it, but I did. It was easier than I thought. Just one shot. I had kept an old letter in which she threatened to kill herself. It was worded just right. I left it and the gun near her."

The professor and I just stared at him, but we didn't doubt. Nobody could have.

"All day something bothered me —something I'd forgotten, or done wrong. Only an hour ago it came to me. I had wiped my fingerprints off the gun, but I hadn't put hers on it. Hers had to be on, or it couldn't be suicide. I had to come back and put them on. And then—"

And then he'd found house and corpse both gone. And, once the shock was over, the most perfect out for murder anybody ever had. No wonder he hadn't helped us rebuild those grids.

"I had to tell you," he mumbled. "I was crazy to tell. But they can't convict me *if the body is gone.*"

It's always a mistake to underrate the other fellow. That's what we'd done with Milquetoast. He was small, but fast. Before the pro-

fessor or I could move, as if shoved by built-in springs, he jumped for the panel board, grabbed the controls, and swung them clear around.

The professor howled. We both jumped for the little guy, but he'd already grabbed two of the smaller cables on the board. There were two blue arcs as he yanked them free.

I reached him first with a haymaker to the jaw. Even after he was limp I hit him a second time—for Josie.

Meanwhile the professor had swung the controls back, grabbed the cables, and was holding them to their terminals. I knew he couldn't connect them without cutting off the juice altogether. Meter needles were still pulsing wildly, but settling back to something like rest.

"We can't stop to reconnect now," he gasped. "Another break and we'll lose synchronism. Get your wife out."

I could see he meant but quick. Milquetoast was still on ice and looked safe enough. I took the cellar stairs three steps at a time—and went out the kitchen door because that was nearest.

The row of maples on Bonita Road. High fences between, and a good quarter of a mile the long way around to Kendrick Road. I couldn't expect the professor to hang on that long. I went back into the kitchen.

Another kitchen. The wrong house. The color scheme was different. There were dirty dishes in the sink and more on the table. I'd stepped out of Time One.

Into Milquetoast's house!

Swearing—or praying—and seeing the professor sweating under the strain of those cables, I ran into the dining room. That was where our entrance was—Josie's and mine.

No foyer, no street door in this dining room. Of course not. Only the Time One house would have all four entrances. I headed back for the kitchen through the living room. That's where I saw her.

It's no good speaking ill—but she looked as if maybe Milquetoast had had to kill her. Big, with a face that had spoiled and selfish written all over it even in death. The gun lay beside her. But I had no time to waste. There was no entrance in the living room.

My thoughts were racing like mad. If I went out by the kitchen entrance—the only one this house had—I'd get back to Time One all right. But to reach my own entrance I'd have to go clear around, unless I could climb a fence—and I knew I couldn't. Go back into the kitchen, and I'd land in this house of the dead again. Dead end.

Sometimes things click just as you get desperate, or because you are. I grabbed up a chair, smashed a kitchen window, and caught a glimpse of red grass and cone-shaped, feathery trees outside. Taking the chair along, I went out the door. Green grass and Bonita Road with its maples.

The window, from outside, wasn't broken. From inside, I'd smashed only the Time Two window. So I used the chair again, from outside.

Then I jumped up on it and climbed through into the house. The kitchen was different again. Having sidestepped the time grid, I'd got back into the kitchen of Time One, where we'd met Milquetoast. I didn't stop, but raced through into the dining room and out of the house again. On the step I about-faced and went back in. Into the house we'd called home.

"Josie!" I yelled.

She ran out of the kitchen to meet me, hair stringy and apron cockeyed and the loveliest thing I ever saw. Not giving her time to talk, I grabbed her and yanked her out the door. We stood panting together by the azalea bush.

"Joe Gates," she said, "you let me loose this minute or your supper will be burnt to a crisp."

But I didn't let her go, just held her, thinking how close a thing it had been—no supper, no house, no Josie.

"We're going out to dinner," I came back, "to celebrate how lucky I am to have you back, which I will explain later. And now I have to see a man about a murder, and I want you to promise you will not go back into the house even for a second, no matter what."

She looked at me, and I guess it was what she saw or guessed that made her promise. So I went to the nearest cellar window and kicked the glass in. After looking to make sure it was the Time One house I was getting into, I climbed down.

The professor was still hanging on, but his arms shook. I yelled at him to say we were O.K. He

For smooth and thrifty shaves that last
Slick, easy ones that sure are fast—
The best low-priced blade you can get,
Say well-groomed men, is Thin Gillette!
Precision made to fit your Gillette razor exactly
Gillette
4 for 10c
Produced By The Maker Of The Famous Gillette Blue Blade

turned toward me, haggard with strain.

"Can't hold much longer. Have to make sure—the others got out."

What could you do in a case like that? I ran upstairs again, made sure I was picking the right entrance—the living room one this time—and walked out and in. The blond man was taking it easy in a big chair with a brunette on his lap. Greta? I didn't stop to ask.

"Get out," I yelled.

The big guy may have been slow, but he got that all right. He heaved himself out of the chair, Greta and all, and carried her right along. We left the house in a dead heat, and then, as if we expected something to happen to it, turned and looked.

Nothing happened.

"Don't go back in," I warned them. "The professor is in trouble."

It meant breaking another cellar window, because we were on a different side of the house. Again I dropped into the Time One cellar. Again I yelled at the professor that he could let go, we were all out.

But a shadow hunched itself on the floor. It jumped and hit the professor like a tackler on a football field. There was an awful glare of juice gone wild, a snap and crackle of arcing currents. Against the light two figures stood out for a split second—the professor's and Milquetoast's. And suddenly I couldn't see them any more. It was dark again, and my eyes felt the way they do when you go into a movie in broad day.

Then the light of half a dozen yellow bulbs came back, and I could see what I couldn't believe.

Half of the air conditioner—or time grid—was lopped off as if a knife had cut it. The half where I'd seen the figures last. The ends of cables and bus bars, cut clean across, shone in the break. Of Milquetoast and the professor there wasn't a sign.

So the little man who had to kill got away from the police. Whether there are worse things in the time state he landed in I don't know. As for the professor, he just might manage to find his way back again some day.

But I don't think he will.

After a last look around, I went upstairs and walked out to meet Josie by the azalea bush. Then we walked the long way around—even though I knew the time grids were dead I couldn't go back in then—and told Greta and her husband how things were. When I told him where he could find a furnished room, he went right over to clinch it.

Me and Josie, we don't like furnished rooms. So we told the bank we'd changed our minds and would stay. Josie stored the professor's stuff in the attic, bought some of our own furniture, and made me put in clear windows all around, some of them hinged to open. So it's now a pretty comfortable house even though the air conditioning doesn't work.

After all, there *is* a housing shortage.

THE END.

SINECURE 6

BY HORACE B. FYFE

The lookouts didn't really expect to see anyone coming in from outer space; it was, after centuries of watching, just a political job. Which meant utter incompetents on whom the future of the race depended.

Illustrated by Swenson

His security, Nurald Quil, stood at the entrance of the transport's air tube. A few obsequious junior officers had gathered to help him watch his numerous belongings being transferred to the security station.

The transport captain, out of deference to the new station chief's official position, was giving his personal supervision to the loading. Through the long, flexible tube rigged between the ship's air lock and an entrance port of the spherical space station, crew members were floating innumerable crates and bulky bundles.

The captain, a dark, austere man,

looked up from checking the stenciling on a few of the boxes.

"Your security, I see, has been supplied with all the latest instruments."

Quil smiled faintly, and glanced at his three companions. Stolid Weksho did not change expression, but the black-haired, mercurial Sarli snickered delightedly.

Jac Rugay, slouching against the bulkhead, coughed and regarded the captain with calm amusement.

"One should not always believe what is in print, captain, especially in this modern world of 2376," he remarked.

The captain, turning his head, was forced to tilt it considerably to meet Rugay's sardonic, gray-eyed stare. He was not certain that the too-pale features under the sandy hair were sneering.

"You see, captain," said Quil suavely, "the station is supposed to be equipped with all the communication and detection devices perfected in the last two hundred years, plus all logical variations. It seemed superfluous to bring the latest unlikely developments."

"So," explained Rugay, "we brought a five-year supply of certain luxuries not ordinarily included in the annual ration cargo."

The captain swallowed hard.

"I seem to remember," Quil mused, "that the captain, as transport commander, signed for the equipment. What did it come to, Jac?"

"About a million creds," answered Rugay unconcernedly.

"I am sure the captain will be able to think of a suitable explanation. He has, after all, the whole voyage of five billion miles back to Earth to consider it." Quil smoothed the velvety material of his slightly protruding jacket front. "Of course, commanding a first-class spaceship, he undoubtedly has many influential friends."

Not a million creds' worth, the captain thought; but he felt it would be useless to mention it. He remembered some of the rumors he had heard of this Quil about Venusian transport licenses. If even Expediter Bascomb could not melt him down, he was too smart to neglect disposing of this equipment.

Quil turned to his companions.

"I don't believe I'll wait to meet the old chief. Let me know when he and his rabble have transferred."

"I'll call you," said Sarli.

A few hours later, Quil and his supporters had completed a cursory inspection of Security Station 6. They had tramped seemingly endless corridors, hesitated over intricate control panels, gaped at unbelievably complicated instruments, and even fiddled with the artificial gravity.

At last, they gathered in the routine communications room, where a few marvelous mechanisms maintained constant contact with distant Earth. The screen of the automatically Earth-directed scanner showed a bright, flickering point of light near the center of the view—the transport's stern rockets.

Quil chose the least uncomfortable chair and thrust his bad right

leg out in front of him. The eager Sarli was peeking into various cabinets and drawers, while Zury Weksho just as typically stared into the screen. Jac Rugay had dug into some filing cabinets and seemed interested in their contents.

"What are you learning, Jac?" called Quil.

The tall man looked up from a report he was scanning.

"After the year 2254," he quoted, half sarcastically, "during which over two hundred meteorites were reported, it was decided to eliminate recording any object smaller than one hundred tons."

"I don't intend to report any at all," said Quil dryly.

Sarli nearly doubled with laughter, and even Weksho grinned.

Rugay continued, unperturbed.

"Thirty-eight years after operations were begun, a technician, through carelessness, missed reporting a meteorite which showed on the automatic recording. Public opinion being what is was then, the man was executed."

He stopped and pulled out his handkerchief for a short fit of coughing.

"Sol's Crown!" exclaimed Sarli impatiently. "Let's not bother with fairy tales."

"Well, apparently, the idea was—it *might* have been a spaceship. They had just finished setting out the security stations after absorbing the effects of the Collision."

"And they knew enough," agreed Quil, "to worry about the Murser fleet coming back. It left the solar system in 2180 and they expected it to return. You see—I learned a lot of history during the election campaign."

"What else do you know?" asked Sarli.

"It took only ten years for them to set out the four orbital stations. Then another ten years to build number five and put it south of the plane of the ecliptic. This was the last, except for replacing one of the orbital stations that was blown up during the Expediters' Reorganization. My public should be proud of my knowledge."

"You owed it to the public," laughed Sarli. "Little enough to pay for a soft berth, with legal immunity from the Expediters' annoyance."

"I trust that, as my campaign manager, you put it differently?"

"Five-year trust, never-ending vigilance, Earth's outpost, crushing responsibility, humanity's future," recited Sarli.

"By the way, your—vigilance," inquired Jac Rugay, "just what would you do if the radeteks recorded a foreign body of over a hundred tons?"

Quil grinned and rubbed a lump on his jaw.

"Report all three of you to Earth Central. Undoubtedly, you'd all be executed."

"Not with what we know about you," smiled Rugay.

"I know you don't have any future," replied Quil, "but Sarli needn't think that just because he's the cousin of the Expediter of Venus, old Bascomb would let him

out of that transport license affair. He thought that was his own graft."

"I can always pass the health exam and go to Venus."

"Good for you," said Rugay with something of a sneer. "I don't think I could even pass for Earth residence now. Say, did you know that in 2283 the station was struck by a planetary body the size of Pluto?"

"This station?" exclaimed Sarli.

"That's what the radeteks showed, until the crew pulled a pet dog out of the wiring. Then the planet went away."

"I must inspect the wiring some day," said Quil. "Meanwhile, if young Weksho will break open one of our crates, I think we should celebrate my election—just as if I hadn't bought and paid for it!"

"After that," said Sarli, "I'm going to turn on all the radeteks and throw the empty bottles out the port to see if they register."

"Your idea of sport?" said Rugay.

"I guess I better get the stuff, huh?" spoke Weksho. "What kind?"

"Think you could find some of the 2300 Marconol?" asked Quil.

"Sure. Label says 'Radetek M-2369, var-5, tube set A'. They stacked it on the top layer, too."

"Where on top, Zury?" asked Rugay intently.

"Fourth crate from the left."

He went out.

"I never get tired of him, Nurald," said Rugay.

It was several months later—Earth October, 2376—when Nurald Quil ran into a crisis worse than any in his political career.

As in the early days, before throwing small objects out into space had become a bore, he was awakened by alarm bells. Rolling over in bed, and struggling to sit up, he realized that it meant that the first alarms, buzzers and flashing lights, had not been answered.

He sat on the edge of the bed, holding his throbbing head in his hands. He would have preferred to wake up slowly, after having made a night of it.

"Turn them off!" he shouted, hoping someone else might be in better condition.

Rex Sarli, with his vibrant health, usually sobered first. If he could not handle it, Rugay must be awake by now. There were no technicians among them—who needed one at a security station nowadays—but they should remember which of the old radeteks they had turned on.

He scrambled to his feet, forgot his bad right leg, and sprawled across the deeply carpeted deck. Pulling himself, panting, to his feet, he groped for some clothes.

After squirming into a full-cut set of green coveralls without being caught in his zipper more than once, he slipped on a loose white jacket. Going through the door, he swept his dark hair down over his forehead with one hand to hide the lumps. Almost simultaneously, he clapped on a floppy beret with the other hand.

Having rushed through the salon of their living quarters, he reached the corridor leading to the offices.

The bells were still ringing in short, maddening bursts as he galloped toward the central instrument room.

Crashing open the door, he entered the office. The others were already there.

Dark, nervous Sarli, in flaming orange coveralls, was scampering from one bank of master indicators to another. Weksho amiably followed him about. Rugay stood in the center of the room, running his eye around the counters against three of the walls. He looked over his shoulder as Quil entered.

"Maybe you know some way to stop them, Nurald," he shouted over the clangor of the alarms.

He glanced then at Quil's hands, and the latter realized he had forgotten his gloves.

"This is just the master indicator room," he told Rugay. "It shows which of the radeteks are operating in their own compartments. I never found out how to control them from here."

"Well, this place must be here for a reason. Cut the power somehow, before that crazy Rex breaks something."

Quil thought swiftly. In his occasional wanderings through the intricacies of the station, he had come across a good many charts of the machinery and wiring. He thought he knew where to cut off the power of this section of the sphere. It would mean, however, that they would have to grope about in the dark. If he could find some way to acknowledge the alarm—

"The first thing is to find out where the detection is being made. Look out, Rex!"

He limped along the counter, scanning the dials and lights of the individual panels. On the side opposite the door, he came to a section of push buttons. Above, on the wall, was a plastic covered chart.

"This must be it," he said. "Let's see . . . a small button for every alarm bell in the station . . . a larger switch for each main section . . . and—"

He reached out and pulled the most important looking switch. The bells stopped.

"Now," he said, facing the others, "who started all this?"

The three gazed at each other in silence.

"I guess they were still turned on from a month ago," said Sarli finally. "I don't know why they went off, though."

"Just to cover everything," suggested Quil, "somebody better go up to the routine com room. Maybe they sent a special ship out. If they did, and surprise us, it will be on all the telecasts in the System."

"I'll go," said Sarli, moving toward the door.

Quil noticed that several of the lights along the counter were still burning.

"Did you have to turn on *all* the old radeteks?" he shouted after the departing Sarli. "Jac! Dig out some of the charts. Let's locate these gadgets that are working."

Rugay walked deliberately to a drawer and searched through it. By the time he found the necessary

records, Quil was irritated into impatience.

He snatched the booklet from the other and took it to the first active panel.

"This is the 2163 model in Compartment 11—note that down, Jac. And this is the 2209 model, variation E, in Compartment 24."

"Not so fast," said Rugay.

"That one is quiet . . . and the next . . . this is model 2214B, variation O—"

"Variation C," corrected Rugay, peering over his shoulder.

In half an hour they had them all listed. Most of the active indicators were of the newer types, including all of those so constructed that only absence of power made them inoperative.

Sarli returned just after the alarm bells had begun to ring again, and Quil had shut them off.

"They must start every half hour, unless they are attended to," said Quil. "See anything on the screen, Rex?"

"Just the stars," answered Sarli.

"Good. Well, let's try to close down some of these toys. We might as well make the rounds; it would take us hours to discover how to take over control from there—if it can be done at all. Why didn't I bring a technician instead of three grafters?"

"Interplanetary diplomat," corrected Sarli.

"Spaceship agent," said Rugay.

"Detective," Weksho said, coming in a poor third.

"Con man, inside contact, and moron with a photoelectric memory," Quil summed up acidly. "But we made it pay off. However—Jac and Rex, suppose you go up to routine com and call Earth Central on the radiphone. Say it's a test, and see if they volunteer anything."

Rugay nodded.

"Sarli can tell them their last automatic telecast came in garbled."

"Hope they aren't scared at getting a call from us," said the shorter man. "I've always wondered if we really could contact them."

Quil turned to Weksho.

"You stay here, Zury. Look over these indicators. Remember which ones are on and tell me when I come back if any have changed."

Taking Rugay's list, Quil started for the first compartment on it.

The first of the old models was not too tough. The on-off switch was plainly labeled and easily found. He turned it off. The cessation of its faint humming left a dead silence in the compartment. He scurried along to the next on the list.

By the time he had worked his way up to the models of the past twenty-five years, he could feel himself tiring. His leg was aching with the unaccustomed exercise. He paused to rest in Compartment 39, wishing he had had some breakfast. He had better finish this, however, rather than have all that pandemonium again.

This was a 2353 model radetek, he verified from his list. Only two decades old, it had a smoother hum than the other antiques. He pulled out the folding seat at the control table and sat down.

Staring at the glowing panel lights, he fumbled in the table drawer for the instruction manual. He had found that was the quickest way for him to discover how to shut the machines off. Just look on page one for the first operation—and then reverse it.

True, there had been one where that method had not worked, and he had blown out a set of tubes instead. There was more than one way to get in office.

The diagram on the manual cover caught his eye. It showed an imaginary example of detecting a foreign body's approach, including use of an automatic viewer directed by the mechanism itself.

"Why don't I try it?" Quil asked himself. "Come to think of it, what *is* cracking all the jets?"

He leafed through the booklet and found a color photo of the control panel. After several years experience with political double talk, he could read almost anything with a fair chance of understanding all that was meant to be understood.

In a few minutes, he thought he had it. The screen at the end of the table must be operating; it was merely set at complete dim.

"Never been used since it left the factory," he murmured cynically, turning the indicated knob.

The screen brightened. The voice shrank up in his throat. He suddenly felt chilled and, somehow, physically light.

It was a spaceship!

It was a spaceship such as had not been seen in the Solar System for two hundred years. He could not accurately estimate the size, for he did not know the distance. But its existence was enough.

Quil reached over and killed the screen.

Then he sat staring at his hands, breathing heavily.

"What am I going to do?" he whispered.

His first impulse was to get out of there and hide. At least, he could return to the others and pretend that nothing had happened.

He knew he could not.

Aside from the feeling that had come over him of being exposed to the view of the whole universe, there was something he would simply have to do—or at worst, try.

This was what the station was here for. No matter if no one seriously believed it would happen at this late date. No matter if it had degenerated into a political sinecure. If he let this ship past, there would be tragedy—and Earth would know who to blame!

"Why did it have to be me?" he groaned. "Two hundred years it's been here, and nothing went wrong till I came!"

"What did you say, chief?" asked Sarli.

Quil whirled around on the seat. He had not heard the younger man come down the corridor.

"Earth Central didn't say anything. They have a cracked jet operating their radiphone anyway. Jac is up there, trying to think of something good to pull on him."

He looked at Quil rather oddly.

"What's the matter?" asked Quil,

straightening his beret defiantly.

"Oh . . . nothing. It . . . well, for a moment, your eyes looked queer."

"Look at this screen," Quil told him, twisting the knob, "and let me see your eyes!"

"Uh!" Sarli gagged.

Quil dimmed the screen again and nervously rubbed the lump on the left side of his jaw.

"What do you think of that, Rex?" he asked.

"It never happened!" said Sarli, edging toward the door.

He did not leave the compartment, however.

"That's not a playback of some kind, is it?"

Quil shook his head. He indicated his list of active instruments, taken down by Rugay in the other office. Turning the screen on again, he stared moodily at the image.

"We have to stop them," he said. "Might as well face it."

"How?"

"I don't know."

"We have all sorts of communication stuff."

"*All* sorts," agreed Quil. He began to drum his fingers on the panel.

"There must be some we can operate. Maybe Jac can put something together—"

"What happened," Quil interrupted sourly, "when you and Jac tried to repair that intercom between your sleeping quarters and the salon?"

"But these are supposed to be in working order."

"If they've been checked in the last hundred years. Besides, they are supposed to be operated by people who know how. I'm no technician. I'm a politician. What are you?"

"Why, I . . . I—Well, I guess just a cousin of the Expediter of Venus," Sarli admitted miserably.

"Jac might have picked up some of this stuff if he cared; but with his future, why should he. And you know Weksho."

There was a futile silence. Sarli examined the alien ship on the screen and shook his head.

"I can see him passing Luna now," he mused sadly.

"What?" Quil jumped. "Oh, you mean—Well, he's got to pass us first, before he gets to the Solar System."

"What could be hard about that?"

"Be some help, will you? Go fetch Jac down here. Maybe he can choose a likely radiphone."

"Shall I see if there's a description of the Murser ships in the files?"

"That's what I was thinking, too," said Quil.

"What could be hard about that?" corridor, he examined the image of the spaceship again. Unless he had jogged the dial regulating the degree of magnification, there had been an appreciable lessening of the vessel's distance. Something had to be done without delay.

He decided to look at the other radeteks. Leaving the screen on but dimming it as he had found it, he went out.

Making his way along the corridor, he checked six more machines in four different compartments. All

were of the fully automatic type which he could not turn off. One of them also had an attached telescreen, but he liked the style of his earlier discovery better. He was more familiar with it.

When he returned to Compartment 39, he found Sarli and Rugay just arriving.

"Rex tells me you found something," said Rugay calmly.

He had found the folding seat and made himself comfortable.

"A little demonstration," said Quil, irritated at the other's calm.

He reached over Rugay's shoulder to brighten the screen.

"I don't think I need explain to *you*."

Rugay's calm vanished. For the first time in Quil's memory, his eyes bulged. His mind, of course, was racing along the same paths of reasoning which had led the others to despair a short time before. Judging from the shocked expression on his face, he was reaching the conclusion just as quickly.

"No ship photos listed in the files," Sarli told Quil.

After his little moment of superiority, Quil was plunged once more into uncertainty.

"Let's get out of here and think," he said.

They went up to the salon, picking Weksho up as they passed the indicator room. Quil waved aside the string of model numbers the latter tried to recite.

He tried to make himself comfortable on a luxurious couch, but found himself sitting on the edge of it. Rugay got out a bottle of choice Marcohol, fumbled with it a while, and finally put it away unopened.

"What did you do?" asked Weksho.

He usually tried to hide the fact that he was really not very bright behind a mask of blond stolidity; which made his feats of memory more remarkable. Quil had returned him loose among the government's secret files and had found him better than a photostat device. Now, however, he felt something was wrong.

"We found out what rang the bells," Quil told him.

Weksho raised blond eyebrows.

"There is a spaceship somewhere near enough to show on a screen."

"Think old Bascomb got sore enough about the licenses to send for us?"

Quil stared at him. In the last hour, he had forgotten how he had come to be here. He found he was too worried to curse at Weksho's slowness.

"The point is, Zury," he explained patiently, "this is not an Earth ship. Nor Martian nor Venusian. It's a stranger."

"How can that be?"

"How can it be!" Sarli broke in shrilly. "What do you think this station was put here for? The silly fools thought there would be something to look for. They looked for it two hundred years. Then we . . . *we* had to come out here and *find it!*"

"Take it easy, Rex," said Quil.

He turned to Weksho.

"Zury, have you ever seen a pic-

ture of a ship from the Murser fleet?"

"I don't know," answered Weksho.

"Can't you remember?"

"No. Show me and I can remember."

Sarli sprang forward.

"Let's go!" he cried.

The four of them left the room in a rush, Weksho being hustled along by Sarli's grip on his arm and Quil bringing up the rear at a limping trot.

They hurried down to Compartment 39. Inside, the others stepped aside with unconscious deference to Quil's impressive experience in these matters.

He turned the knob to brighten the screen. The strange craft reappeared.

Weksho examined the image. He nodded slowly.

"Saw one on Page 158 of *Modern History* in school. There were some little things different. Mostly, it's the same. Page 158 was about the Murser fleet."

"That's it, then," said Quil. "They're back."

Rugay pulled out a handkerchief and coughed into it.

"I never thought," he said at last, "that I would ever consider doing something for the public good. It seems to have sneaked up on us."

"The first time," admitted Quil, "that I can't make use of a little pressure or bribery. If I get out of this I'll never hold a public office again."

"The telemovies have it all wrong," Rugay went on. "With no noble emotions at all, I know it's unthinkable that we do nothing to stop them."

"I keep thinking of that technician who missed the meteorite in the old days," said Sarli.

"It's not just our necks," said Rugay. "If that ship is what we think, it's the future of the human race."

"Come along," ordered Quil.

He led the way up to the routine communications room, where most of the general information was filed.

There, they searched through several drawers and cabinets. Finally, Quil collected and carried to a desk various likely directories. He began to leaf through them hastily.

The first he discarded when he found it contained a list of spare parts for the intercom system. The second concerned some obscure wiring.

Finally, he came upon a list of correlating radeteks with radiphones according to date and technical advancement. The nearest to the 2353 radetek was a radiphone assembly produced in 2356.

"Compartment 44," he read. "What spiraling vacuum arranged this museum?"

They charged down the corridor to an elevator. Weksho said he could find 44, and proved it.

Three desks of controls were located in this compartment according to their numbering, they corresponded to three different communicators. Quil picked out the 2356 and plumped himself down in a

metal swivel chair before it. Ten seconds spent surveying the mass of dials and knobs confronting him, and he reached for the first drawer.

"Look in the other side for a manual," he told Sarli.

Quil, however, found it first. With the urgency of the situation goading him on, the phrases of the instructions romped chaotically through his mind:

" . . . to measure angle of beam put out . . . make calls with maximum light unless adjusted with distant station . . . turn light on-off switch to 'complete dim' for best reception . . . for maximum range, couple this set with station reflectors 14, 15, or 27—"

"Oh, bull!" exclaimed Quil. "Jac, run over to 39, will you, and see if you can dope out a direction on that gadget? I can't just pick up a mike and blow my jets in all directions."

He turned his attention to locating the more important controls. To the right of the panel, a small, covered unit was screwed to the desk. It had four sets of toggle switches and jacks numbered "14," "15," "27," and "Spare." After referring once more to the manual, he found a cord attached to the panel. It ended in a plug, which he inserted into jack "14." He turned the set on.

By the time Rugay had returned, he had caused the radiphone to show signs of life. Little lights glowed discreetly here and there, various dials permitted their flickering needles to hint at information, and the mechanism hummed chummily.

"I can't make it out," reported

Rugay. "There is a way to figure the direction—I looked it up—but it's like navigating a spaceship. Not for me!"

"I don't know as I need it yet," said Quil. "I can't make this screen light."

With the doubtful assistance of the others, he tried the controls in every combination he could think of. The radiphone almost operated. Not quite; the screen refused to light.

"Maybe something is broken," suggested Sarli finally.

"Possible," admitted Quil. Probably never even checked. Well, anything broken we're not going to fix."

"What about the other radiphones?" asked Rugay.

They got out the correlating booklet and pored over the lists.

"There's no reason," said Quil, "why we should stick to that first radetek. I suppose they all register. Maybe we should try an older model."

He flipped the pages until he came to the earlier sets. They chose a couple designed before the Collision and started out to locate them in the lower numbered compartments.

The very sight of a 2179 set discouraged Quil. It had undoubtedly been old and battered when it had been installed. He chose to try one about five years younger, although it, too, was a museum piece.

"No manual," Rugay reported after searching the desk. "It must have been one that a child of three could operate."

"I'm not three," said Quil, "but maybe I can dope out how to do it anyway."

The first thing, he thought, *was to get some power into it. That must be the switch. Yes, the dials lit up and the set began to hum. Now—was he connected with a beam on the outside of the station. Must be . . . oh, there it was, labeled "reflector".* He had to connect a wire lead to it; this set was really crude.

Ah, that made a needle jump on the board, all right. Now to get the screen lit. Those three knobs should be the controls. Turning the first one produced a click.

"It's lighting up," breathed Sarli.

"This one reads in a scale of brightness, I imagine," said Quil, turning the second slightly.

"More," advised Rugay, "I still can't see anything definite."

"Watch that dial over it though," said Sarli. "Seems to move toward that red line as you turn."

"There must be one of these for focusing," said Quil. "All I get so far is a lot of blurry shadows."

"Maybe it's still warming up."

"You probably haven't got it bright enough."

"Try the third knob."

"Watch that dial."

"Maybe you have to locate the other station first?"

"How can he? We don't know where it is."

"That needle just passed the red line—!"

Somewhere inside the set electricity spat viciously. An odor compounded of ozone and burning rubber seeped out. A bright red bulb

at the top of the control panel flashed on as all other lights and dials went dead.

"It stopped," Weksho informed them.

Quil looked at him. He could not contradict the statement.

"I gave it a little too much—whatever I gave it!"

Rugay looked around the compartment.

"Which one next?" he asked.

"I bet I could ruin them all," said Quil. "I wonder if that spaceship is still around."

With one thought they all left the room and hurried to Compartment 39 on the next deck. The image of the ship was still to be seen on the screen. It appeared to have turned somewhat; at least they could see its beam now.

"I don't like that," said Quil. "It must be coming abreast of us. We have to do something soon."

"You better call up Earth Central," said Sarli.

"Anything they could do would probably be too late," Quil answered him.

"Why don't we find out where this thing really is, then?"

"There were lots of spacesuits in the exit ports," said Jac Rugay. "We could go outside and try to spot it."

"That's something," said Quil. "Lead the way!"

They took an elevator to the very top deck, where one of the main ports was located. Rugay broke out some spacesuits. After deciding that Weksho should remain inside as a safety precaution—his own safety, Quil meant, though he did not say so—they fumbled their way into the equipment.

The portal mechanism, designed for any possible emergency worked very simply. In a few minutes, the three of them stood on the outer skin of the station.

"See anything?" demanded Quil, twisting his head around inside the helmet in a vain attempt to push back the beret that had flopped over his eyes.

A garbled jumble answered him as both tried to reply at the same time. The suit radiphones canceled each other.

Rugay stared coldly at Sarli through the fishbowl that was his helmet.

"I was going to say," he remarked, "that if you do see it, I brought a portable floodlight."

Quil finally squirmed from under his beret, which slid maddeningly under his chin. He saw a hand cable rigged on waist-high supports and took hold of it with one hand. No use floating around every time he tried to take a step. The builders had not considered artificial gravity arrangements necessary for the outside.

They pulled themselves along the cable and goggled "up" at the stars. When they had been all around the station, Quil realized it was hopeless.

"We need a telescope at least," he said. "That screen magnifies terrifically."

"Before we go in, shall I flash this light around?" asked Rugay.

Quil thought a moment.

"Didn't I read something about emergency rocket fuel being stored in the station for the transports?" he asked.

"They have it," confirmed Sarli. "Weksho would know where."

"Come on inside then," Quil ordered.

"About time, Nurald," said the other. "I don't feel so well out here. Need something to hold my stomach down."

They returned to the port and went in. As soon as they had their helmets off, they put Weksho on the trail.

About twenty minutes later, they had collected a large drum of radioactive liquid and several space flares. Quil insisted on taking all of them out.

"Why the flares?" demanded Sarli.

"How else would we set the stuff off? They have the same material in them. We'll just open the valve and let go a flare at it. If they're not morons, they should see that."

"Not next to me, we won't," said Rugay. "I'm no sunny cruiser."

"All right. You two hold the drum. When I tell you to, heave it out as far as you can."

He fumbled with the bulky flare. Clumsily, with the thick gauntlets of his suit, he worked the timer dial around to one minute. He made the others shift the drum about so that the valve pointed away from the station.

"Well, I got that right," he thought, as a stream of the fuel shot out into the pressureless void.

He jammed the flare into the opening and jerked its lever.

"Shove!" he shouted over his radiphone.

Rugay and Sarli heaved. The drum went flying out into space. Lanky Rugay, with his long legs, managed to hook one foot on the hand cable, but Quil had to grab Sarli by the ankle to keep him from following their makeshift flare.

They watched the fuel drum recede, spinning lazily.

"You know something?" inquired Sarli. "I think we ought to step inside a moment."

Without a word, the others whirled and beat him to the port. Quil sailed through head first. As he bounced off the far wall, he caught a glimpse of Sarli clawing his way in and pulling the port shut behind him.

Just before it was completely closed, a harsh, raw brilliance lighted the air lock momentarily.

"I guess it went off," said Quil.

"Let's get down to old 39," suggested Sarli eagerly. "I want to see what the screen shows."

They shed their suits hastily. Only a life-long habit made Quil pause to don his beret.

Sarli made the elevator whine as they dropped to the other deck. Bursting into Compartment 39, however, they were stricken with disappointment. The alien ship now showed them her stern.

"They're past," sighed Quil.

"Maybe they turned away," suggested Sarli hopefully.

"No," said Weksho flatly.

"How do you know?"

"Same stars as when we watched the transport go back."

Quil had a sudden flash of Weksho standing by the routine com screen the first day they had been at the station.

"Exactly the same, Zury?" he demanded.

"Same around the center. This screen shows more."

"Sol's Crown!" exclaimed Quil.

He brushed them out of his way and made for the corridor. Forgetting to favor his bad leg, he rushed to the nearest stairway, scorning the elevator at the end of the passage.

Sarli caught up to him passing the master indicator room, and the other pair clattered up as they burst into the routine communications office.

Quil threw himself into the chair and snapped on the set.

"You want Earth Central after all?" panted Sarli as the set warmed up.

"No," said Quil. "But now we have a place to aim at."

"It better be right," put in Rugay. "You can't change this thing."

"The beam must spread a little," said Quil.

He checked, with his newly acquired experience, to see if this rig was set for maximum output. Apparently it was.

The receiving screen glowed to life. A carefully groomed young man appeared. It was obvious from his brisk manner that he yearned to show off his efficiency after a boring, inactive watch. Quil guessed the security stations did not call in very often.

"Earth Central, Security Station Net," announced the brisk young man formally.

"Get back in the dark!" snarled Quil. "I don't want *you!*"

The brisk expression faded to blankness. This was succeeded by startled embarrassment. The watchers in the station saw him turn half away to check his dials, at the same time reaching for his switch.

The screen went dark.

"Have you cracked a jet, Nurald?" demanded Sarli.

Quil scraped his knobby knuckles nervously over the lump on his jaw. He had hardly heard the question.

The automatic caller continued to function. The same young man, less brisk and more wary, reappeared on the screen.

"Earth-Central-Security-Station-Net!" he rattled off defiantly.

"Turn it off!" grated Quil.

The young man's left hand fumbled uncertainly over his chin. One finger got in the way of his mouth and he absently began to chew the nail.

Quil leaned forward and glared. The young man hastily reached for his switch. The screen went dark.

Almost immediately, however, it glowed again. A strange visage appeared.

Nurald Quil allowed himself a deep breath. Behind him, the others could not repress a murmur.

Quil saw that the man appeared to be looking him in the eye. That

must mean he had perfect contact, sending and receiving.

"You want me?" inquired the image. "That flare for us?"

The Earthman's nerves twanged. This was just beginning.

"You . . . you . . . you—"

He stopped and raised one finger in an urgent gesture to wait. He fumbled for a handkerchief to wipe the sweat from his face. Failing to locate the right pocket, he gave up the idea.

"If you're from Murser's fleet—you must not land on Earth," he said, pulling himself together.

The man cocked an eyebrow at him.

They could see that he was not alone. A pair of healthy looking young men and a clean-featured, brown-haired girl stood behind him. The speaker was older, but the firm planes of his face showed strength and alertness. *Must be their commander,* Kil thought.

"I'll explain," said Quil desperately. "Jac, dig in the files for those movies— You *are* from the Murser Centaurian Expedition, aren't you?"

"Ancestors were," admitted the other laconically. "All cracked up on Centaurian planets. Rough time. Took till now to put a new ship into space."

"Good," said Quil. "Now, then— The Murser Expedition left the Solar System in 2180."

The stranger nodded agreement.

"Well, in the year 2258, our time, there was a bad accident in the Solar System."

Rugay nudged him. He and Sarli had found filmed records prepared for the station and showing its history. They had also produced a small viewer.

After that, it was easy. Quil showed the descendants of the original interstellar explorers what had happened when a small star fragment of negative matter from some stellar cataclysm had reached Sol. The movies reconstructed the story of the Collision with the outermost moon of Jupiter, the destruction of several asteroids, and the near miss when it passed Earth.

Then he showed them the effects of its seething energy: how it had dealt the planet a bath of radiation that sent evolution wild.

"That's not all," Quil told them as the film ended. "It would not be too bad, I suppose, if it had merely caused a few mutations among humans and animals. But think of the germ life—!"

"Is that why we must not land?"

"Having grown apart from us nearly two hundred years, you would have no immunity whatsoever. Our scientists fight, of course, but we are so far behind!"

"But we had hoped you could help us catch up technologically. We have spent all our energies combating our environment—"

"My friend," Quil told him, "there have been twenty-six major plagues on Earth since your ancestors left. Two of the four men

at this station have incurable diseases. I myself am an unsuccessful mutation; although you can't see it because of the clothes I wear, nearly every bone in my body is growing little bumps and branches. On my right thigh it's so bad I have a limp."

The strangers looked at each other in dismay.

"We have two hopes," he went on. "Our Martian colony is now as bad off as Earth, but emigration to Venus is so rigidly supervised that the colony there is still healthy. Our other hope lies in your people. With just the possibility that some of you survived, the people of Earth long ago set out these stations in space to intercept you if you returned. They were determined to preserve you as our future —we have none of our own."

There in the other vessel the voyagers held a brief consultation. Then the commander asked Quil a few questions. Since Earth Central had no doubt been receiving all this, even though they had not transmitted, Quil felt safe in recommending that they circle the planet at a distance and exchange information by radiphone recordings. At least, now they were warned, though he was too ashamed to mention how lucky it was.

Before the ship commander signed off, he favored Quil and his companions with a long, memorizing glance.

"Thank you very much," he said. "End of communication."

Quil nodded gravely. The screen darkened. There was a long silence.

He reached out and switched off the radiphone.

"Before that flaming Earth Central gets in here again," he explained.

"For once in my life," sighed Sarli, "I can say I was in on something useful. Quil, you made history!"

"Did I convince them?" asked Quil, rubbing the lump on his jawbone.

"You could get a spot on teledrama tomorrow!"

"As soon as I get back to Earth," mused Quil, "I must try my stuff out on the crowds in a big way."

"Are you giving up this soft spot for politics again?" demanded Rugay incredulously.

"I am," stated Quil. "And the first thing I'm going to clean out is the security station system. This was too close!"

"You're going to what!"

"You three, by the way, are fired. As soon as I can buy enough votes to oust the Expediter of Earth, you can be secretaries to the toughest reformer in the System!"

THE END.

★ ★ ★ ★ ★

THE UNDAMNED

BY GEORGE O. SMITH

Generally speaking, bomb defusing squads have short, and not very merry lives. But the Martians had cooked up a fuse that couldn't be defused, no matter how skilled, quick-thinking, or clear-headed the defusing expert!

Illustrated by Swenson

Plutonium was an equalizer. Nations learned the art of being polite, just as individuals had learned. To lash out with Plutonium wildly would be inviting national disaster, and to behave in an antisocial manner would get any nation the combined hatred of the rest of the world—equally a national disaster.

This was surface politeness. Beneath, the work went on to find an adequate defense, for now that all nations were equal, the first capable of defending itself was to be winner. Ultimately, atomic death was licked. Nicely licked but only at the expenditure of more power than it took to develop the atomic weapon itself. It was, however, developed. And that nation then lashed out—to find that other nations of less belligerency had also licked the problem.

The war—fizzled. For the wall shield that killed the effectiveness of the atomic bomb found no difficulty in stopping a lesser weapon.

All war—fizzled. And nations looked at one another and formed the Terran Union. Then the Terran Union looked to the stars for a new world to conquer. They found Mars ready and waiting.

The Terran Union colonized Mars and exploited the Red Planet as men have always done with a new frontier. The next hundred years wrought their changes and the Martian Combine fell away from the Terran Union because of the distance, the differences of opinion, and because of slight mutational changes.

There were interplanetary wars. The First was fought to eliminate the fact of governing Mars from Terra, the Second was fought to

stop interplanetary piracy and to force both planets to respect the integrity of the other. The Third Interplanetary War was started because of sheer greed.

During the Third Interplanetary War, atomic bombing sprung up, died, and then continued on a very strange nuisance value basis. It became complex, and upon the 1327th Day of the Third Interplanetary War, interplanetary robombing assumed a most dangerous aspect. The swift action of a small group averted disaster, and from that day on, the course of the Third Interplanetary War was assured.—I. A. Seldenov's History of Sol, Vol. IV.

The call bell tinged gently in a code that pierced sleep.

Colonel Ralph Lindsay reached out sleepily and nudged a button at his bedside. Equally sleepily, he donned trousers over his pajamas, slipped his feet into scuffs, and carefully headed for the door. The open door swung a shaft of light across the bed, and Lindsay opened his eyes wide enough to determine whether Jenna were still asleep.

Satisfied, Lindsay went down the corridor of the ship blinking at the ever-present light. He let himself into the scanning room and dropped into his chair. He picked up the phone and said: "Lindsay speaking, answering 3379X."

"General Haynes, Ralph. They got one through."

"How?" asked Lindsay, coming awake.

"Super velocity job. The finders were behind by a quarter radian, at least."

"Jeepers," grunted Lindsay.

"Say it again," returned the general. "We thought we were bad when we let one out of five hundred slip through to you. This, remember, was one out of one. Period. If they use 'em in quantity —and I see no reason why the devils won't—I can see a good record all shot to pieces."

"Where's it headed?"

"According to the course-calc, it should be hitting Mojave most any minute."

"Well, I'd better get on it," said Lindsay. "May I contact you later?"

"Do so, by all means," said the general, signing off. "We can't permit things like this to happen. I won't hang my head in shame at one per cent missed, but when one hundred per cent of a shipment runs through, I'm scared."

Lindsay mumbled an agreement and then clicked the switch to another line. That would be quicker than juggling the hook for communications central. The new line came in immediately and Lindsay dialled a number.

It rang.

Lindsay waited.

And a sleepy voice answered: "Roberts."

"Lindsay, Jim. We've another one. Haynes just called. Heading for Mojave, should be arriving pretty soon."

"Haynes just called and it is due to land?" demanded Roberts. His

voice seemed to come awake and alert instantly. "High speed, huh?"

"Yup."

"I'm shucking into clothing and I'll be in the scanning room of your ship in a few minutes."

Roberts hung up, making a remark about finding things in your own back yard. It was true, reflected Lindsay. The spaceport outside of the scanning room greenhouse lay darkly quiet. A few flickers of distant lights were caused by motion of men between them and him, and on the horizon he could see the soldierlike columns of the vertical boundary marker lights piercing the sky. Lindsay fumbled in a pocket, and swore because his cigarettes were in his battle shirt on the chair beside the bed, and he was still dressed in pajama top and trousers over the pajama bottoms. He wondered whether he could steal in and get cigarettes, or whether he'd better wake Jenna anyway, and wondered where she kept them in the ship—somehow he never really knew because there was always a package available when he wanted one. He wondered—

And the door opened and Jenna entered with a bright smile. "Cigarette, darling?" she asked. Over her nightgown she wore Ralph's battle shirt. She was holding the lighter to two of them held simultaneously between her very red lips.

He would have forgiven her anything for that. And the fact that instead of being dull with sleep, Jenna looked fresh and bright gave the woman an added charm. "Ghastly time to be up and around," she observed with a smile. She handed him one of the cigarettes and glanced at the clock. "Oh-two-hundred," she said idly. "Pacific War Time. Thirteen hundred and twenty-seventh day of. What's up, Ralph?"

Lindsay puffed deeply and let the smoke trickle out with his words. "Another one—high speed job."

Jenna nodded. "Roberts?"

"He's coming right over."

"I've coffee brewing. It hasn't landed yet?"

"Not yet, but we're expecting it any minute."

"We'll have time for coffee."

"We'll *take* time for coffee," said Ralph. "Roberts will do a better job for a bit of stimulant and something warm."

Jenna yawned and laughed at herself. Ralph turned as blue streamers cast flickerings on the walls. Outside in the dark, ships of Terra's fleet were taking off, trailing their flares into the twinkling sky above them. They were getting out of range of the robomb blast; clearing the vast Mojave Spaceport. The marker lights winked off as the last ship left the port, and the sudden roar of the skytrain crescendoed and then died as the personnel of Mojave left in haste. Only the decontamination ship remained on the port.

Seconds later, a pale actinic glow suffused the area. The walls of the buildings glowed with it as the wall shields hugged the buildings

and anchored them to the solid crust of the planet. In the ship a counting-rate meter climbed up the scale and a radiation identifier winked, indicating that it was very hard gamma that triggered the counter. The internal meter showed no danger inside of the ship; it was far enough from the nearest building on the port.

The door opened again and Jim Roberts walked in. "Give it to me," he said crisply, nodding cheerfully at Jenna.

Ralph's wife nodded back and then left to get the coffee. When she returned, Ralph had explained to Captain Roberts fully.

"The devil," muttered Roberts. "Looks rough."

"We've been expecting the high-speed stuff, though," said Jenna, pouring coffee into three cups.

Lindsay opened his mouth to speak. "You've—" he started, but

he was interrupted by a ground-shaking rumble. Out of the dark California sky a juggernaut fell, its braking blast lighting up the area. The shrill of its passage came then, a lowering shrill that started up in the ear-splitting register and running down the scale like a dying siren until it was lost in a moan. The earth shook again as the monster hit the sands of the desert. It sent them high in a mighty impact crater, plowed its short furrow, and then at the bottom of its inverted cone it nuzzled into the ground and—started to tick.

Lindsay's jaw closed and he continued: "—been predicting it for a long time, Jenna." Then he laughed shortly and with just a bit of mirth. "I won't even let a Martian robomb interfere with what I intend to say." He became serious again. "No, Jenna, I think you're the only one who has been insisting that there will be a high speed job coming along."

Roberts nodded. "The boys at the driver labs claimed it couldn't be done."

Jenna smiled. It was an elfin smile that brought out the unearthly beauty of the woman. "That's because I'm Martian," she said simply. "I know how their minds work."

"That you do," assented Roberts, sipping his coffee. "No one but a Martian could have unpacked the Gooney."

Lindsay's face paled slightly. Reference to the first and only fuse that Jenna had ever dissected brought goose pimples to him. Up to that particular time, the Martians had never included killing charges in the fuses themselves. Once the thing was out of the robomb, the fuse could not harm any one. But this diabolical jigsaw puzzle was different. And Jenna had handed the three pellets to Ralph and then fled. Lindsay followed her drawings, and they all knew that no one but a Martian could ever have been able to follow the mechanical labyrinth of that fuse in safety. Yet they all knew that she'd been safe where not one of them would have been, for if she'd not asked, amusedly, for permission, the Gooney would have taken them, one by one. The Gooney had been dissected and the robomb it came with had been fitted with a Terran fuse and shipped back. All hoped it would give Mars as much worry as it had caused Terra.

"I've tried detonating it, and naturally, no dice," said Roberts.

"Better defuse it, then. You've hit it with everything?"

"Everything but another atomic."

"That's asking too much," said Lindsay. "They're packed to the limit with atomics now, and doubling the power—*brrrrr*."

"Well," said Roberts with a slight smile, "my gear is in the battle buggy. Outside."

"O.K.," said Lindsay. "We'll move back to a clearer area and set the recorders going. It's cold, for Haynes' outfit didn't so much as heat it on the way in. High

speed job for fair, and probably loaded with mercurite."

The ship sat down again far enough from the buildings so that the green actinic light from the force fields did not rise to dangerous levels. The pale glow gave enough light to make the television cameras usable without any other artificial means, though the shapeless blob that was the battle buggy and Jim Roberts was hard to keep from losing with the unaided eye.

Roberts' voice came over the communicator. "O.K.? I'm about to go after that devil."

"Go ahead, Jim," said Lindsay. A few beads of sweat popped out on his forehead.

Jenna frowned. "It must be sheer hell to be like him."

Lindsay nodded, held a finger up to his lips. Jenna nodded, too, having been warned that the recorder was on, and also that Roberts could hear every word.

"I'm within one hundred feet of the crater, Lindsay. My first approach will be with the standard radiation detectors and the initial tools." This was well-known to all, but stated for recording purposes. "I have stopped the battle wagon at this distance. I am picking up my kit. I am stepping to the ground, now, and—"

He was interrupted by the kaplunking sound in the speaker. It was a cross, in sound, between plucking a screen door spring and dropping a boulder into a placid lagoon. A blinding flash of light burst against the dark sky, an expanding ball of flame raced skyward and died in a faintly luminous cloud that boiled upwards to a terrific height. Immediately afterwards, the ground shook madly. The counting rate meter chattered and screeched as it overloaded and the radiation identifier winked furiously on all pilot lights, indicating all kinds of possible radiation. The pale actinic glow on the walls of the squat buildings flamed bright, wavered, flickered, paled again, and went out for good. The area and the ship was pelted with a fine rain of dirt, pebbles, and fused glass.

The roar of the sound came, then, a thundering tortured blast that tore at the planeted ship, whistling through the minute scratches from previous blasts, and producing a thrumming sound.

Quiet came once more, and only the faint buzz of the counting rate meter audio broke the silence.

Then a slight sob from Jenna.

And Colonel Ralph Lindsay took a deep, indrawn breath that shuddered his large frame.

He shook himself, and turned to his wife. "Get hold of yourself," he said harshly.

Jenna nodded, tossed away two tears, blinked her eyes and sat down weakly. "I'll be all right," she said. "I must."

"They all get it, sooner or later," gritted Lindsay. "That's . . . that's—"

"Shut up, Ralph," ordered his wife. "You'll be blubbering next. Save it for when you can. We've got work to do."

Lindsay looked at her, and as

he looked, he calmed. "It's rather tough," he said. "There's been several . . . many. But few within sight. Well, he's gone and there's nothing we can do to bring him back."

"What makes it particularly tough is that Jim Roberts was the only one in the crew that was halfway stable, mentally," said Jenna. "The only one who was not carrying a mental load."

Lindsay nodded. "A case of having specialized mechanical ability and putting it to use in the best way. But Jenna . . . I'm . . . you're—?"

Jenna smiled. "We aren't," she agreed. She stood up and leaned against him lightly, and then moved into the circle of his arm. "But remember that neither of us is active in decontamination work. General Haynes needed a stable man to direct the group, one that would correlate the information and keep it. Not one that he'd have to replace every few weeks. Losing Jim is tough. Better it have been one of the others; Lacy, who lost his family and the will to live at the same instant of blast; Grant, who is just a plain thrill-seeker and sportsman; Garrard, who does anything and everything without looking ahead because he is convinced that the Book of Fate has his every minute move printed in letters of fire; Harris, who saw his brother die and who now has a psychopathic hatred against the things but has no great dislike for the Martians who fashioned them. He hates our robombs as much as he hates theirs. Well—"

She was interrupted by the phone. Lindsay answered. It was General Haynes.

"Who?"

"Roberts."

"Bad?"

"As soon as the dust clears away we'll know. The force fields are usually good, and they kept out the radiation from the buildings. As soon as the surface activity dies out, Mojave will be workable again. We're leaving as soon as we can."

"Better mobilize your big men," said Haynes. "The second just hissed past us. Looks like a long siege. That one was mercurite, wasn't it?"

"Nothing else."

"Thought so. We saw the blast from here in space. Know what that means?"

Lindsay nodded and said: "It means they think they have an untouchable fuse. Otherwise they'd not bother sending the high-powered stuff over."

"Right. They'd not make us a present."

"Also, there is something about that fuse. Something, something. Look, sir, robombing is a fine art. There is but one defense against it—and that is for those who want to live to get out of the neighborhood. That's what the skytrains are for. That's why you send us immediate word when you have their course predicted. The secondary defense is not really a defense as it is a preservative measure. The force fields go up to protect

man's work, and when the blast comes, it really destroys nothing. Then, after a given time, the people return and go to work in safety because the force fields kept the insides of the building from either destruction or radioactivity.

"Now," continued Lindsay, "that one went off within ten to twenty minutes after it landed. The immobilization period for that area is but a couple of days at best. If not touched, the fuse would tick away for weeks while the area stands idle. But not with this new, high-speed job that is also loaded with mercurite. Something—

"Where was this new job?" he asked, c h a n g i n g the subject abruptly.

"Headed for the Gary steel mills," came Haynes' answer.

"I'm putting in a call for my crew," said Lindsay. "We'll all meet in Chicago-South. There's something—" He shook the thought away with a violent shake of his head. "We'll find out in Gary."

He went to the general call phone and cut a tape, fed the end into the automatic transmitter, and checked to see that the general call was being transmitted. He wondered, briefly, just which of them would get to Gary first.

When the decontamination headquarters ship arrived, it was second. The little private stratospeedster that was Jack Grant's own pride and joy was sitting in the main landing field of the Gary port when Lindsay arrived. Lindsay sort of expected that, for Grant's little high-powered job placed the owner no more than a couple of hours from any place on Terra, most of which was spent in going up and down through the thicker atmosphere near the surface.

They landed, and the air lock clanged open. Moments later Jack Grant entered the scanning room with his usual whirlwind manner.

"What's cooking, Ralph?" he greeted, extending an eager hand. His free arm he swept around Jenna, giving her a vigorous hug and a kiss on the forehead. "Jenna, I swear you're more beautiful by the day. Please?"

"Please what?" she countered, freeing herself and backing off a bit.

"Please poison him and marry me?"

"Nope," she said with finality. "And I won't stand to see him . . . ah . . . removed, as you indelicately put it."

"Ralph, you wouldn't mind getting bumped off for your wife's happiness, would you?"

Lindsay usually lived through Grant's brash manner; made a mental apology for the man because he himself did not understand the kind of mind that saw little serious in life. And usually Grant's disregard of the serious side of life gave all a moral uplift, a chance to disregard with Grant all of the problems that hack and tear. But Lindsay had just seen Jim Roberts go up in a sun-hot inferno, and he

was slightly sick with shock. Now, Grant's blithe manner seemed banal, crude; insufficiently sensitive. If Grant had no feelings, he should at least consider the sensitivity of others. Lindsay tried to cheer himself, and managed at best a weak, sickly grin that was lost on Grant completely. Lindsay might have made some biting remark, but he noted with some wonder that Jenna was not bitterly unhappy in the badinage. Jenna, he knew, could and would clutch hysterically at any light point in a crisis to gain just a bit of stability. Lindsay himself was inclined to cling doggedly to a situation, deviating not one bit, until it was finished satisfactorily. Then he would let down.

So noting Jenna's whimsical smile, he merely said, and it was with an effort: "Think it would make her happy?"

Grant laughed and hugged Jenna quickly and said: "Look, you don't mean she's actually happy—?"

Jenna nodded brightly, made a full turn to unwind Grant's arm from her waist and pirouetted over to her husband. That stopped Grant, and he smiled cheerfully and tried to look downcast.

"Love, unrequited," he sang in an off-tone basso, the opening bars of Gilbert and Sullivan's " 'Love unrequited robs me of my rest.' " Then he grinned. "Love unrequited and my boss and his best wife who haul me out of a sound and peaceful sleep to go out and pin a baby-blue ribbon on a Martian robomb. O.K., fellers, I'll pull its teeth and then, Jenna, may we continue where you left me off?"

"Been watching it?" asked Lindsay.

Grant nodded. "I've been here since it started in. The mills are clean, the force fields are up, and the temperature of the thing is low enough to handle by now. I'm ready."

"We're waiting," said Lindsay.

"Waiting?"

"For the rest of the crew, you know. This is serious."

"Well, it is in my district," laughed Grant. "Let the rest assemble. By the time they get here I'll have the fuse out and in one hand. Probably semi-disassembled."

"Jim Roberts was a good man," warned Lindsay.

"He was that."

"You're waiting."

"Why?"

"Because there seems to be more to this than meets the eye."

The door opened in time for the entering men to hear Lindsay's last words. Garrard and Harris came in quietly, sat down, and started to smoke. Garrard puffed his pipe with calm indifference, and Harris smoked furiously on a cigarette that he puffed into a long, hot ember that almost burned his lips. Garrard spoke first.

"More than meets the eye, huh?"

Harris nodded, but his mind seemed elsewhere. "Mutants?" he said, giving the inert robomb out there a personality. Harris was

pitting himself against a personality when he went to do his job. He had no real hatred for the Martians who engineered them, but he felt and acted as though he were pitting his brain against a wholly alien, inimical sentience.

Lindsay caught his thought, and though Harris was half solemn, the allegory fitted. For what are engineering improvements but a mechanical mutant?

Garrard smiled, and shrugged. "I say let's find out who is more ingenious," he said. "And let's do it quick. Grant, are the mills running on the servos?"

"Uh-huh, but it isn't good enough. There ought to be a human hand at the place instead of remote controls. I agree, let's get going before something happens to that load of steel out there. Stalling production is the only reason for robombing in the first place. Let's lick that fuse before they find out how much mercurite to put in in order to blast the force fields right out of the planet's crust," said Grant. "Go on with your lecture," he told Lindsay.

"Well, first-off, it's a new, high-speed job. It's also loaded with mercurite. They've, as usual, packed everything into their Sunday Punch. Their cocksuredness makes me certain that they think this fuse unremovable."

Grant turned to Jenna. "Jenna, you're of Martian stock, part way, anyway. Have any ideas?"

"Only to agree with Ralph. They wouldn't pack a robomb with mercurite if they thought for one second that it could be inerted. That would present Terra with a large volume of very valuable material. They have succeeded in one item, they've used a new high velocity drive in it. If they weren't certain of the ability of the high speed drive to escape all detector-driven gear, they wouldn't use mercurite. Mars is not profligate, Jack. Tossing away a robomb load of mercurite on a space-premature is not economically sensible. When they use mercurite, it must be nearly one hundred per cent effective."

"Um . . . interesting thought," laughed Grant.

"Like to try it out," said Garrard. "If they feel that certain, I'd like to know which of us is suitable to survive."

Harris blinked. He flipped the cigarette into the receptacle. "Let me at the stinking thing," he said in a flat voice.

"Wait for Lacy," said Lindsay.

"Lacy may be late," said Grant. It was one of the very few times that Jack Grant sounded solemn. He was almost pityingly solemn, and it made Lindsay wish for his return to the thick-skinned attitude, for Grant sounding solemn was strictly out of character. "He may be late," insisted Grant, "because he hates to come here."

"He won't deny a general alarm," said Lindsay.

"No, he will not. But I say let's not hurt the guy more than we have to. I say let's go out and pull that thing's teeth and save Lacy the hurt

of seeing you and Jenna together."

Lindsay frowned. He wouldn't say it, but Jenna did. "Jack," she said softly, "is that a soft spot that makes you want to keep Tom Lacy from hurt, or are you just giving arguments to get out there and try your skill against that bomb?"

"A little of both," said Grant cheerfully. "Plus the fact that he makes me uncomfortable, somehow. It always makes me uncomfortable to see any man so tied up in his own past emotions that he cannot see clearly."

"Skip it," said Lindsay firmly. "I admit that he is too bound up in the past, but you, Grant, could stand a little more of his sincerity of emotion just as he could stand less."

Harris had been quite alert, and broke in at this point. "All due respects, Grant, but you run this as though you were playing a game. I know why Lacy is that way. His game was for the reward, yours is for the game's sake. He saw everything he'd spent his life for go up in a flaming volcano. Years of living, of loving, of building; puffed out in a millionth of a second. Puffed out, obliterated, disintegrated beyond all recognition. Grant, have you ever loved anything, deeply?"

Grant nodded. "All right, fellows, I'm sorry. I'm sorry that I don't understand Lacy better. I've loved, but I've never let it be my life. For when I've lost, there has always been something—or someone —else. Make off like my chips weren't in this deal, will you?"

"Still a game, Grant?" laughed Garrard. "A game where every throw of the dice is forecast is no game."

"What am I?" chuckled Jack Grant. "Just the baaaaad boy of the decontamination squadron? Sure it's a game—the whole thing is a game. And whether you're playing your brother for marbles or playing the devil for fame, you play to win."

"I say—" started Garrard.

Grant out-talked him. *"I* say that I am the master of my fate. And if anybody calls me Invictus Grant I shall cut his throat. Or her throat," he added, turning to Jenna with a grin.

The door opened again and Lacy entered. "Quite a conference," he said. "Well, Ralph, where is it and what's to be done?"

Lindsay brought him up to date. Then they ran off the recording of Jim Roberts' unhappy attempt.

"You may just be overcautious," said Lacy when the recording had finished. "It may have been a circumstance."

"Unlikely. The thing is . . . has too many facets. Jenna herself claims that a new item was expectable. Haynes had his statisticians at work, and their findings were that the quantity of late has been diminishing, which from past experience means that something new is due."

Jack Grant looked at Lindsay.

"You don't suppose they're after the decontamination squadron?"

"If they were gunning for us," said Harris in a voice that shook with hatred, "they'd do it this way!" Then he settled back again. "But would they waste mercurite on us?"

"As a means of keeping production open, we're worth mercurite," responded Lindsay. "And it might take something more than the ordinary to go out and eliminate men who have made a business of defusing the things. Assassination is almost impossible.

"And," he said reflectively, "we may be barking up the wrong tree. All I know is that we've a brand new type, and as usual I've called the entire group in to get the initial factors all complete. Are we a bunch of persecution-complexes that we think they're after us?"

"No," grinned Jack Grant, "but remind me to tell that idea to Ordnance. Eliminating the decontamination squadron is like poisoning a city by shutting off its sewage system, perhaps, but it is effective!"

"We'll forget the personal angle until we get this one solved," said Ralph Lindsay.

"Well, let's go," said Grant eagerly.

"We'll take this easily," objected Lindsay.

"No gambling instinct?" queried Grant with an amused smile.

"That's why he's boss," said Garrard dryly. "Lindsay has neither an ax to grind nor an ego to build up.

"Huh?" asked Grant.

"Admitted . . . and I'm sorry, Tom," said Garrard to Lacy, "that Lacy has his ax to grind. You, Jack, apparently get an egotistical lift out of this 'game.' Lindsay has neither."

"O.K., boss man," smiled Grant. "What do we do?"

"All the radiation meters we can pack into the battle buggy. Also we set up a radiating system near it. Then come back and we'll run through the spectrum to see. Now—"

"It's still in my district," reminded Grant.

"You're overeager," objected Garrard.

"And you're too complacent," objected Harris.

"Trouble with you," said Lacy, "is that you get too deep-set in pitting your skill against a mechanical puzzle and forget to tell us the moves."

Lindsay smiled sourly. "To finish this round robin, may I tell you *your* faults, Tom? You are inclined to make a false move. Not consciously, but there have been a few times when you came out by the skin of your teeth, having pathologically missed a fine point, and having caught it consciously."

Grant reached in a back pocket and rolled a pair of dice on the floor. "Roll for it?" he asked hopefully.

"Never touch dice," objected Harris.

Grant reached inside his jacket

and fanned a deck of cards. "Cut?"

"Games," said Garrard sourly. "Games of chance in a preordained world— Bah!"

Jenna hit the table with her small fist. "Stop it, all of you! A finer collection of neurotics I've never seen collected under one roof before. And not one of you dare suggest that Ralph pick a man. Haynes would be wild if he knew that Ralph had been put into a psychological hole by being forced to send any man into . . . into . . . into that." Deigning to name the menace was itself a psychic block, but Jenna did not care. Instead of talking further, she reached for the deck of cards. "The thirteenth card," she said, starting to deal them off, "One, two, three," placing them face up before her. "Lacy, hearts; Harris, spades; Grant, diamonds, and Garrard, clubs. —Ten, eleven, twelve, and thirteen!"

The ace of spades.

Harris smiled, got up cheerfully, and went to get his trappings ready. Garrard grunted. "Games of chance," he sneered. "In a—"

Grant jumped up. "Look, Ed," he snarled. "In this completely preordained world of yours, how can an inhabitant know the will of the Gods of No-chance? What criterion would *you* have used to select Harris, huh? So if nothing else, the laws of chance do that much, to at the very least tell us who the Gods select. And so long as we ourselves do not know the answer, who cares if it is preordained?" Having delivered this, Grant looked at Jenna. "Bright girl," he said. "An instrument, if you admit Ed's plan, of the Gods."

Jenna smiled. "You mean 'whom the Gods—select,'" she corrected blithely.

Grant hauled out a flask, unscrewed a one-ounce cap and poured it full. "Here," he snapped, practically forcing it into her mouth.

Jenna spluttered. "Thanks," she said, calming.

know how Lindsay feels, and it is know how Lindsay feels, and it is not up to him to tell us. But I don't care whether it is predestiny or not, and whether we're all non-gamblers or goody-goody boys. But we'll use this set of cards for any future guesswork. See? And, we'll cut, ourselves. See? We'll not make the mistake of forcing Jenna or Ralph into dealing out a poisoned arrow."

"I wish people would stop worrying about my peace of mind," growled Lindsay. "I admit all that's been said. I am not to undergo any personal emotional strain. But being psychologically packed in cotton and linseed oil isn't good for me either."

"And all over one problematical bomb," smiled Jenna. "Why don't we wait. If the first one was coincidence, certainly the rest, after solution, will make us all feel like overwrought schoolgirls."

Harris returned at this point. "Ready," he said with a smile. His eyes were bright, and he seemed eager. There was an exultation about Harris, a bearing that might

have been sheer theatrical effort, yet it seemed as though he were going out to do personal battle with his own personal devil.

Lindsay nodded briefly. "Give us every single smidgin of information. If you scrape your feet, tell us. Understand?"

"I get it. O.K., there's been enough time wasted. S'long."

His voice came clearly, and in the dawning light, the automatic television cameras adjusted the exposure as the dawn came brighter by the moment. The battle wagon headed out across the rough ground where the teeming city of Gary had lived a hundred years ago. A mile or two beyond, the battle wagon entered the parking area, now cleared of its horde of parked 'copters by the fleeing personnel.

The ship lifted and retreated a few miles, finding level enough ground to continue observation, and Harris went on and on.

"I'm stopping," he said, and it was faithfully recorded. "I'm about a hundred feet from the crater, setting up detectors and radiators. Shall I drive back or will you come in and pick me up? Seems to be safe enough. He hasn't gone off yet."

"We'll pick you up but quick. Ready?"

"Ready. Everything's set on the servos."

"O.K."

They met, immediately whisked into the sky and back to more than a safe distance. Then they went to work, searching etheric space and subetheric space for radiations. They hurled megawatt pulses of radio energy and subradio energy at the ticking thing. They thundered at it with audio, covering all known manner of vibration from a few cycles per minute of varying pressure to several megacycles of sheer air-wave. They mixed radio and audio, modulated the radio with the audio and hurled both continuous waves and pulsed waves, and mixed complex combinations of both. Then they modulated the subradio with radio, which was modulated with audio and they bombarded it with that. Rejecting the radiation bands entirely, they went after it, exploring the quasi-optical region just below the infrared in the same complete manner. They fired at it constantly, climbing up into the heat waves, up into visible light and out into the ultraviolet. They hurled Brentz rays, Roentgen rays, and hard X. They tuned up the betatron and lambasted it with the most brittle of hard X rays. They hurled explosive charges at it, to shock it. Then they sent drone fliers, radio controlled, and waved reflecting masses at it gently and harshly by flying the drones back and forth above it.

After three hours of this—and three more incoming robombs of the same type had been reported, they gave up.

"They're piling up," grunted Lindsay.

"Wish we could move it," said Grant.

"You always wish that. You

tell us how to grapple with three hundred tons of glass-slick, superhard ovoid with a high diamagnetic surface and a built-in radiation shield. Moving them is the easiest answer—and the one initially avoided."

Harris blinked. "Nothing else?"

"There's nothing left but to go out and pull its teeth," said Lindsay. "Nothing we know can detonate the thing."

Harris smiled knowingly. "Naturally," he said. "Their point in life is to immobilize Terra. They must not go off until they are ready. They're willing to wait. They found out we could detonate them and then return to work in a couple of hours with radiation shields. So they now get a fuse that cannot be extracted and cannot be detonated until they want it to. Give 'em one chance to prove one effective, and all Terra will be immobilized by them, and they'll drop everywhere. Also, maintaining the force fields takes a lot of valuable power. And if we shut off the fields, it might go up and then we'd lose the whole place."

"How I wish we could take pictures."

"Photographs?" asked Grant, smiling. "I saw one of them once. A family heirloom. Too bad, of course. But what do you expect when the whole world is living in a sort of bath of neutrons, and silver itself becomes slightly radioactive? After all, photography used to use a silver compound of some sort if my physical history is right."

"Silver bromide," said Lindsay slowly. "Look, Harris," he said, his interest showing where his mind was really working, "go out there and make a few sketches. Then come back without touching the thing. Understand?"

"Right."

"I am approaching the thing," he said from the field of action again. "I'm about two hundred feet from it. Working now with the projection box, sketching on the ground glass. This is a fairly standard model of robomb, of course. They load 'em with anything they think useful after making them at another plant, just as we do. The fuse—too bad they can't bury it inside. But it must be set, or at least available to the makers. If they should improve on it, it would be serious business to de-load these things to get to a buried fuse. Yep, there he is, right up on top as usual. Fuse-making has reached a fine art, fellows. Think of a gadget made to work at will or by preset, and still capable of taking the landing wallop they get. Well, they used to make fuses to stand twenty thousand times gravity for use in artillery. But this . . . well, Ralph, I've about got it sketched. Looks standard. Except for a couple of Martian ideographs on it. Jenna, what's a sort of sidewise Omicron; three concentric, squashed circles; and a tick-tack-toe mark?"

"Martian for Mark Six Hundred Fifty, Modification Zero," answered the girl.

"Some language when you can cram that into three characters."

"Well, I'm through. Ralph, so far as I'm concerned, this drawing will serve no purpose. Use that one of the standard model and have Jenna make the right classification marks across the fuse top. That's a better drawing anyway. I'm going on out and defu—"

The flash blinded, even through the almost-black glasses. It was warm, through the leaded glass windows. The eventual roar and the grinding hailstorm of sand and stone and sintered glass tore at the ship. The counters rattled madly and fell behind the driving mechanism with a grinding rattle. A rocketing mushroom of smoke drove toward the stratosphere, cooling down to mere incandescence as it went.

Miles away a production official watched the meters on his servo panel. They were stable. The buildings held. With the lighter radioactinic shields, work could be resumed in twenty-four hours. He started to make plans, calling his men happily. The bomb was no longer a menace, and the mills could get back to work.

"Harris," said Garrard solemnly. "So shall it be! Well, may he rest, now. Hatred such as his—an obsession against an inanimate object. I—"

"Shut up," said Lacy quietly. "You're babbling."

"Well," said Grant in his hard voice, "we can detonate 'em if we can't defuse 'em. Only it's hard on the personnel!"

Lacy looked up and spoke quietly, though his face was bitter. "Jack Grant, you have all the sensitivity and feelings of a pig!"

"Why . . . you—"

Lindsay leaped forward, hoping to get between them. Jenna went forward instinctively, putting up a small hand. Garrard looked at them reflectively, half aware of the incident and half convinced that if they were to fight, they would regardless of any act of man.

It was the strident ringing of the telephone that stopped them in their tracks; staying Grant's fist in midswing.

Jenna breathed out in a husky sound.

"Who was that at Gary?" asked General Haynes.

"We lost Harris."

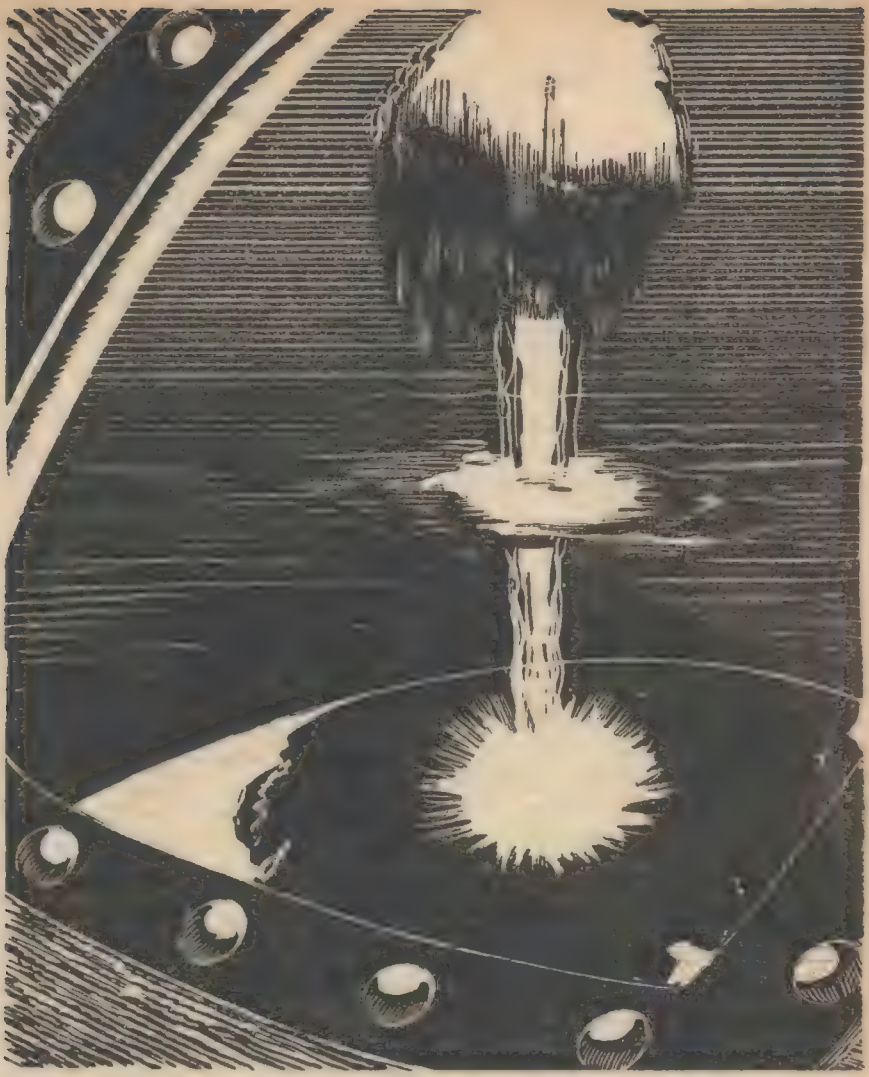
"Same as before?"

Lindsay nodded glumly, forgetting that Haynes couldn't see him. Then he added: "Didn't even get close."

"What in thunder have they got?" asked Haynes. It was an hypothetical question, the general did not expect an answer. He added, after a moment of thought: "You've tried everything?"

"Not everything. So far as I've been able to tell, the things will sit there until we go after 'em. They'll foul up production areas until we go after 'em, and then when we're all gone—what then?"

"Lindsay! Take hold, man. You're . . . you're letting it get you."



Lindsay nodded again. "I admit it. Oh, I'll be all right."

"Well, keep it up—trying I mean. We're tinkering with the spotters and predictors and we hope to get 'em up to the point where they'll act on those lightning fast jobs."

"We'll be getting to Old London," said Lindsay. "That's next. Good thing they dispersed cities a century ago, even granting the wall shield."

"Good luck, Lindsay. And when you've covered all the mechanico-

electrical angles, look for other things."

He hung up, but Lindsay pondered the last remark. *What did he mean?*

The ship was on its way to Old London before Lindsay called for a talk-fest.

"We don't know anything about these things excepting that they go off when we approach 'em," said Lindsay. "Has anybody any ideas?"

"Only mine," grunted Jack Grant with a half-smile. "Something triggers 'em off whenever we come close."

"Couple of hundred feet," growled Lacy, "isn't close enough to permit operation of any detector capable of registering the human body without some sort of radiation output."

"Not direct detection," agreed Lindsay, facing Grant again.

Grant nodded. Then Garrard said: "I've an idea. But I'm mentioning it to no one."

"Why?"

"I don't want to tip my hand."

"Thought you weren't a gambler," jeered Grant.

"I'm not. I can't foresee the future, written though it is. I'll play it my way, according to my opinion. The fact that I feel this way about it is obviously because it is written so."

"Oh Brother!" grunted Jack Grant. "With everything all written in the Book of Acts, you still do things as you please because so long as you desire to do things that way it is obvious that the Gods wrote it?"

Garrard flushed. And Lindsay said: "Grant, you're a born trouble-maker."

"Maybe I should go out and take the next one apart. I'm still willing to bet my life against a bunch of Martians." Then he looked at Jenna. "I'm sorry, Jenna."

"Don't be," she said. "I may be Martian, but it's in ancestry only. I gave up my heritage when I set eyes on Ralph, you know." Then she stood up. "I'm definitely NOT running out," she laughed. "I'm going down to put on more coffee. I think this may be a long, cold winter."

She left, and Ed Garrard looked up at Lindsay, sourly.

"Well?" asked Ralph.

"Look, Lindsay, I may be speaking out of turn."

"Only the Gods know," chuckled Grant.

"Shut up, you're banal and out of line again," snapped Lindsay. "Look, Ed, no matter what it is, out with it."

"Lindsay, what do you know about this rumor about Martian mind-reading?"

"Very little. It is a very good possibility for the future, I'd say. It's been said that the ability of certain Martians to mental telepathy is a mutation. After all, the lighter atmosphere of Mars makes bombardment from space more likely to succeed."

"Mutation wouldn't change existing Martians," mused Grant. "The

thing, of course, may either be a mutation that is expected—in which case it may occur severally—or an unexpected dominant mutation in which case its spread will occur as the first guy inseminates the race with the seeds of his own being."

"Right."

"You don't know?"

"No," said Lindsay. "I don't know which and furthermore it is unimportant."

"Might be," objected Grant. "How many are there and what is their ability?"

"There are about seventy Martians known to be able to do mental telepathy under ideal circumstances. Of the seventy-odd, all of them are attuned to only one or two of the others. So we have an aggregation of seventy, in groups of three maximum, that are able to do it."

"Is any of Jenna's family—?"

"Not that I know of. And besides, Jenna's loyal."

"They might be reading her mind unwittingly," said Garrard.

"Impossible."

"Know everything?" said Garrard, instantly regretting the implication.

"Only that Jenna's father was a psychoneural surgeon, and I've read plenty of his books on the subject. They're authoritative."

"Were, before the war."

Lindsay nodded. "You're thinking of some sort of amplifier system?"

Garrard nodded.

"I doubt it," said Lindsay.

Lacy looked up and shook his head. "It would have to be gentle," he said. "According to what I've heard, the guy who's doing the transmitting is clearly and actually aware of every transmitted thought that is correctly collected by the receiver. Couple a determined will to transmit with certain knowledge of reception, and then tell me how to read a mind that is one, unwilling; and two, unaware." Lacy snorted. "Seems to me we're getting thick on this." He arose and left, slowly.

Lacy wandered into the galley and spoke to Jenna. "Mind?"

"Not at all," she said brightly.

"I need a bit of relaxation," he said. "We've had too many hours of solid worry over this thing."

She put a hand on his shoulder. "Tom," she said, "you're all to bits. Why don't you quit?"

"Quit?" he said dully. "Look, Jenna, I quit a long time ago. Fact of the matter is, there's not one of us but won't kill ourselves as soon as the need for us is over. Excepting you and Ralph. You—have one another to live for. We—have nothing."

"Grant?"

"Grant will be at loose ends, too. Remember, he has been seeking thrill after thrill, and cutting closer to the line each time. This defusing is the ultimate in nerve thrills to him, pitting himself against a corps of mechanical experts. Going back to rocket-racing and perihelion runs will be too tame. He's through, too."

"You all could get a new interest

in life. You shouldn't quit," said Jenna softly.

"That's the worst of it," said Tom Lacy looking down at her. "I quit a long time ago. It's the starting-up that I fear."

"I don't follow."

"I think of Irene—and Little Fellow—and I know that when that area went up, my life ended. I've never had Harris' psychopathic hatred of the things. I've just felt that I'd like death, but want to go out doing my part. I have a life-long training against suicide per se, but I euphemize it by taunting death with the decontamination squadron."

"Yes?" said Jenna. She knew more was to come.

"Alone I'm all right. Then I see you and Ralph. I feel a resentment —not against you, or Ralph, but against Fate or Kismet or whatever Gods there be that they should deny me and give to you freely. It's not right that I feel this way. Life is like that." He quoted bitterly: " 'Them as has, gits!' "

"Tom, I swear that if it were mine to do, I'd give you all the things you lost—return them."

He nodded. "Giving me wouldn't do," he said in self-reflection. "I'd want return—and that is impossible."

Jenna knew well enough not to say the trite remark about Time being the Great Healer. "Poor Tom," she said gently. Maternally, she leaned forward and kissed him on the cheek. An inner yearning touched him and opened a brief door of forgetfulness. He tightened his arms about her for a moment and as her face came up, he kissed her with a sudden warmth. In Jenna, mixed feelings, conflicting emotions burned away by his warmth. She responded instinctively and in the brief moment removed some of the torture of the lonely, hating days.

Then as the mixed thoughts cleared, Lacy found himself able to think more clearly. Though still flushed, he loosened his tight hold upon her waist, and as he relaxed, Jenna changed from the yielding softness of her to a woman more remote. Her eyes opened, and her arms came down from about his neck and she stepped back, breathing fully.

"Sorry, Jenna—"

She laughed. It was not a laugh that meant derision; in fact it was a laugh reassuring to him, as she'd intended it to be. "Don't be sorry," she said softly. "You've committed no crime, I understand."

He nodded. "I was, sort of, kind of—"

"Tom," she said seriously, "there's a lot of good therapy in a kiss. So far as I know, you needed some, and I gave it to you, freely and gladly. I'll . . . do it again . . . when it's needed." Then she looked away, shyly.

A moment later, she looked up again, her face completely composed. "What do you suppose Garrard has on his mind?" she asked.

He told her, completely.

The scanning room was dark when they returned. Out through the viewport the actinic glow of the buildings cast a greenish light over the landscape, creating an eerie impression of the scene. The small buildings, widely scattered, were a far cry from Old London of the nineteen hundreds, with its teeming millions and its houses, cheek by jowl.

"Where's Ed?" asked Jenna, fumbling in the dark scanning room with the coffee tray.

"Gone."

"Gone?" she echoed. "How long ago?"

"Ten minutes or so. He should be there—"

Out, a few miles from them, hidden in the canyons of the buildings, a burst of flame soared up. A gigantic puffball that ricochetted from the actinic-lighted walls of the buildings and then went soaring skyward. A pillar of fire and smoke headed for the stratosphere as the counters clicked. The wall shields started to die out as the force of the explosion was spent.

Lindsay snapped on the lights. He faced them, his face white.

"That," he said harshly, "was Garrard."

Grant nodded. "It wasn't in his Book," he said.

"Neither," snarled Lindsay, "was it in his Book to keep his action secret."

"Meaning?" asked Grant.

"Who was the bright one that mentioned where he'd gone?"

"That should have been obvious," said Grant.

"Obvious or not—he's gone."

"What you're saying is that he's gone because I opened my big trap?"

Lindsay blinked. "Sorry, Jack. But I'm at wit's ends. I do wish that he had his chance, perfect, though." He stared at Lacy.

Tom, remembering that he had been kissing the man's wife less than five minutes before, flushed slightly and flustered. He hoped it wouldn't show—

"Tom, that's a new brand of lipstick you're wearing, isn't it?" gritted Lindsay.

Tom colored.

Jenna faced her husband. "I kissed him," she said simply. "I did it as any mother would kiss a little boy—because he needed kissing. Not because—"

"Forget it," said Ralph. "Did you know what Garrard was thinking?"

"Tom told me."

"Nice reward," sneered Ralph, facing Lacy.

Lacy dropped his eyes, bitterly.

Jack Grant looked up. "Listen, Lindsay, you're off beam so far—"

"You keep out of this," snarled Lindsay, stepping forward.

"I'm not staying out of it. It happens to be some of my business, too. Lacy, this may hurt, but it needs explaining. Lindsay, I'm not a softhearted bird. I'm not even softheaded. But if any man ever needed the affection of a woman, Tom Lacy does, did, and will. And if I had mother, wife, or sister that refused to try to straighten Lacy out, I'd cut her throat! I've made a lot of crude

jokes about the fact that she married you because of your money or friends, but they were just crude jokes that I'd not have made if she hadn't been so completely Mrs. Ralph Lindsay that mere mention of anything else was funny. And you can scream or you can laugh about it, but whatever she did down in the galley, I say, makes a better woman of her!" Then Grant smiled queerly and turned to Lacy. "You lucky dog," he grinned. "She never tried to kiss me!"

Ralph Lindsay sat down wearily. "Was that it, Jenna?"

She nodded; unable to speak.

"I'm sorry," said Lindsay.

"Look, Lindsay—" started Tom Lacy.

Lindsay interrupted. "Lacy, I'm the one to be sorry. I mean it. Pity—is hard to take, even to give honestly. You don't want it, yet it is there. Yes," nodded Lindsay, "if there's anything, ever, that we can do to see you straightened out, we'll do it. Now—"

The phone.

Lindsay picked up the phone and said: "Garrard got it! Where's the next one?"

Haynes said: "Take the one in the Ruhr Industrial District. How'd Garrard get it?"

"We don't know. He went out unplanned, wondering if utter secrecy mightn't be the answer."

"Too bad," said Haynes and hung up quickly. The general didn't like the tone of Lindsay's voice.

Lindsay faced them. "What do we know?" he asked. He felt that he'd been asking that question for year upon year, and that there had been no answer save a mystical, omnipotent rumbling that forboded ill—and that threatened dire consequences if asked to repeat.

"Not a lot," said Grant. "They go off when we get within a hundred feet or so of them. That's all we know."

"Garrard went out without running his intercom radio. He made no reports, thinking that maybe they listened in on our short-range jobs and fired them somehow by remote control when they feared we might succeed in inerting the things!" Lindsay growled in his throat.

"Look," said Grant. "This is urgent. It is also knocking out our nerves. It's not much of a run from here to Ruhr Industrial, but I'm going to suggest that we all forget the problem completely for a few minutes. Me, I'm going in to take a shower."

The value of relaxation did not need pressing. Jenna nodded. "None of us have had much of anything but coffee and toast," she said. "I'm going down and build a real, seven-course breakfast. Any takers?"

They all nodded.

"And Ralph, you come and break eggs for me," she laughed. "So far as I know, I'm the only one that's capable of taking your mind off of your troubles momentarily."

Lindsay laughed and stood up.

Lacy said it was a good idea, and then added: "I'm going to write a letter."

The rest all looked at one another.

If Tom Lacy were writing a letter, it meant that he'd taken some new interest in life. Wordless understanding passed between the other three and they all left Lacy sitting at the desk.

The autopilot was bringing the ship down toward the ground out of the stratosphere, slanting toward the Ruhr when Jenna snapped the intercom switch. "Breakfast," she called. Her voice rang out through the ship. Grant came immediately and sat down. Lindsay was already seated. Jenna served up a heaping plate of ham, eggs, fried potatoes, and a small pancake on the side. "This," she smiled, "is too late for a real breakfast, but I demand a breakfast even if it's nine o'clock in the evening when I first eat for the day. There's more if you're still hungry."

"We'll see," said Grant. He picked up knife and fork but stopped with them poised. "Where's Lacy?"

"I'll give another call," said Jenna, repeating her cry.

They fell to, attacking their plates with vigor. But no Lacy. They finished and still no Lacy. "Come on," said Jenna. "Maybe he's still feeling remorse. We'll find him and then we'll feed him if we have to hold him down and stuff him. O.K.?"

"Yeah," drawled Grant. "Feeding does wonders for my mental attitude. It'll do Tom good, too! Let's find him."

They headed for the scanning room, but it was empty. The desk where they'd left him was as though he had not been there, except—

"Letter?" queried Lindsay, puzzled. "Now, what—" his voice trailed away as he slit the envelope and took out the sheet of paper. He cleared his throat and began:

"Dear Folks:

"I put no faith in Garrard's suspicions, but since he was lost without an honest chance to prove them, I am taking this chance.

"I am taking my skeeter when I finish this and I'm going on ahead, alone. Knowing you as I do, I'll have plenty of time to inspect that robomb before you read this. I'm explaining my actions because I feel that you may need explanation.

"I think the world and all of both Jenna and Ralph, and feel that I may have caused suspicion and unhappiness there. Since I'll have time to take a good look at this thing and also make some motions toward defusing it long before you arrive, or even find this, let my success be a certain statement of the fact that knowledge of my actions by any of you—or even suspicion cast at the presence of the Decontamination Squadron Ship by the enemy—is not the contributing cause. No one will know until I'm all fin—"

Light filled the scanning room, and the ship rocked as it was buffeted by the blast. The light and the heat and the sound tore at them, and they clung to the stanchions on the scanning room until the ship stopped rocking and then Grant made a quick dash for the autopilot, which was chattering wildly under the impact of atomic by-products. It stabilized itself, however, and the ship continued on down through the billowing dust to the ground.

"That," growled Lindsay, "loses us Lacy and proves nothing."

"Not entirely," drawled Grant. "It does prove that whatever agency is directing these things does not require the presence of this ship as a tip-off."

"A lot of help that is."

"Well, I'm nominated for the next try. Unanimously. I'm the only one voting any more."

Jenna gasped.

"What's the matter, Jenna?" asked Grant.

"I just realized that you were all that's left. Just like that—and in a few hours. Poor Lacy."

"Lacy?" said Grant. "He—got his release. It's what he's wanted. May we all find what we want as quickly."

"I hate to see any one courting death, though," said Jenna.

"My only regret for Lacy is that we don't know whether he—and Garrard, by the way—went in the same way."

"Meaning?" asked Grant.

"The rest got it as they headed out to defuse the things," said Lindsay. "At about a hundred feet. We can only assume that Garrard and Lacy went in the same way. I'd like better than an assumption."

"Why?"

"A hundred feet is too distant to detect the human body without radiation. It presupposes either a warning of some type or—" Lindsay scowled and stopped. He mumbled something about a conference with General Haynes. He stepped to the autopilot and set it for the next location. Then he left to seek the privacy of his own office from which to call General Haynes. As he left, Jenna lifted a worried face to Jack Grant.

"Jack," Jenna said, "he doesn't trust me any more."

"It does look bad," said Grant. "After all, every one of them came in your presence."

"They came in your presence, and his."

"Admitted. But—"

"I know," she said, with deep feeling. "But I can't help being Martian. My loyalty is with Ralph."

"Jenna," said Grant softly, "we know that. All of us know it. Yet, there's some agency that is tipping them off. There's been robombs at the other sites for hours now, and not one of them has gone off. They're tying up production until we arrive, and they'll continue to tie up the area until we make a false move. Something or someone is giving them the tip-off. I know it isn't me, you know it isn't you, and Ralph knows it isn't him. The areas are completely cleared, but, of course, there may have been watchers. But Garrard would have gone out unlighted, and possibly Lacy would have done the same."

"Jack," she pleaded, "do you suspect me, too?"

"Jenna, you know I do. I rationalize myself, and tell myself that it isn't so. But nevertheless, there is that lingering doubt. Evidence, Jenna. Evidence."

"Jack, a criminal is considered innocent until proven guilty."

"Jenna, that's for the safety of all who may be accused. But considering a man guiltless does not prevent people from making charges. And there have been many occasions where the accused was forced to go through a strenuous period before proving his innocence. What they really mean is that they will not punish a man against whom no true conviction is brought. Until he is convicted, he can not be punished. And it is up to the authorities to prove his guilt. It is also up to him to prove his innocence. But considering him innocent permits his own testimony to be considered as valid as that of any witness instead of marking it off of the books as the word of a guilty man."

"And I?"

"Forgive me, Jenna. I think the world of you, and there is in me a rather violent mental storm. One side—the larger side, insists that you are loyal, and above reproach. The other side, that tells me to beware of the woman in you, that if you were really clever and treacherous, you would hurl these doubts out in the open and cause suspicion to fall upon yourself. And, you are Martian. A sort of racial instinct warns me. It's unfair, and I dislike myself thoroughly for it."

Tears welled in Jenna's deep eyes. "Jack, please. What can I do?"

"I don't know," he told her.

"I . . . feel miserable," she sobbed.

"It's a tough load to bear," he said softly, putting a hand on her shoulder.

"It's unfair," she said shakily. "Look, Jack, I know you too well to believe that hard exterior. You put that on because you're excessively soft inside and people can hurt you too easily if you're not

careful. I am like that, but I'm not as soft as you are."

Jack laughed a bit. It was a false laugh, designed to lift her out of the doldrums.

It failed.

"For eight long years," she said earnestly, "I've taken from Ralph everything that any woman would find ideal. I've had companionship, tenderness, love and affection. Complete compatibility. He's met my every mood. And not only because it will please me for him to mirror my moods, but because he feels that way too, and his moods change as mine do. He is absolutely happy to follow or lead me into any change of mood and we're never far apart. I've been protected and loved by the man I wanted. That's perfection.

"But for four of those years, I've been unable to reciprocate."

"Now, Jenna, that's not true."

"I love him—even more, now. And I'd do nothing to stand in the way of his happiness. But Jack, remember I'm Martian and he is denied his right to command a battle squadron. Because of me. He's stuck in this noncombat group—because of my heritage. In all that time, he has never shown it, yet he must know. If anything, he has become more tender, more protecting, more affectionate. More tolerant. Yet what can I do to give him release from this? Suicide isn't the proper answer. That would deprive me of what I want, and his desire is not completely to the service. But he cannot have his cake and eat it too."

"That's quite a load, Jenna," said Grant tenderly. "I hadn't realized."

"I ignore it, mostly. But there are times when it creeps up and gets me. I wake at night, thinking deeply. I fret, and go sleepness, wishing there were a way out."

"I think you've well made up for it."

"No," she said with a shake of his head. "He must feel denied of his right to honor by his affiliation—made in the face of public objection to mixed-marriage. I . . . am now worse. An enemy alien."

"You are a Terran citizen," stated Grant.

"I have papers to prove it," she said scornfully. "And any doctor that didn't see the papers but examined me perfunctorily would pronounce me Martian. Ours will always be—a sterile marriage. It cannot be otherwise. Yet until this shadow came, we were both happy."

"Poor Jenna," said Grant, putting her head down on his shoulder and patting the back of it. "And now that the first doubt has crept in, the rest of Pandora's Troubles all come roaring in through the initial breach."

"And now this," she sobbed. "Grant, it's worse than torture."

Grant's mind whipped back and forth between several types of torture he'd heard about and wondered what she meant.

"No amount of torture could pry a secret from you, could it?" she asked.

"I like to think I'm that way," he said.

(*Continued on page 169*)

Alexis Dawydoff, Technical Editor, Air Trails And Science Frontiers

500,000 H.P. ENGINE

Believe it or not, the relatively simple reaction engine shown in this view of V-2's drive develops about a half million horsepower at maximum thrust. Next to the bulkhead separating the exposed section from the main body of the rocket is the curved black hydrogen peroxide tank which supplies the steam turbine, the round drum shaped unit to the left and slightly above. The turbine drives pumps which force fuel into the combustion chamber, the large funnel-shaped unit to the rear of the pumps. The confusing multiplicity of piping is necessary to distribute fuel evenly to the driving unit.

IMPROVING UPON V-2

BY WILLY LEY

***American** scientists and engineers are at work souping up V-2 to make it a more powerful research tool—or weapon if the need arises.*

"Wisdom is better than weapons of war; but one sinner destroyeth much good."—Eccles. 8:18.

For several reasons I'll never forget the date on which I saw my first V-2, the main reason being the gigantic rocket itself.

The date was the 17th of December, 1945. The place was Washington, D. C., to be precise the corner of Fourteenth and F Streets, N.W. During the afternoon of the same day my old friend and collaborator Herbert Schaefer and I had listened to Dr. Roxbee Cox of Powerjets, Ltd., the research laboratory from which the British jet engines had emerged during the war. A rather complete disclosure of what had been done and when in Great Britain in the jet propulsion field, told by a man qualified to tell the story, this lecture formed the annual "event" of the Institute of the Aeronautical Sciences. It was the Wright Brothers Lecture of 1945.

During the lecture I had looked with some amazement at the pictures of the British jet engines which were thrown on the screen. They were big and impressive, each one represented the last word in jet engines during that particular stage of development. They also were somewhat better than their German counterparts of the same dates, even though the first jet-propelled plane actually to fly had been a German model—many months before the much publicized 160-mile hop of the Italian Caproni-Campini No. 2.

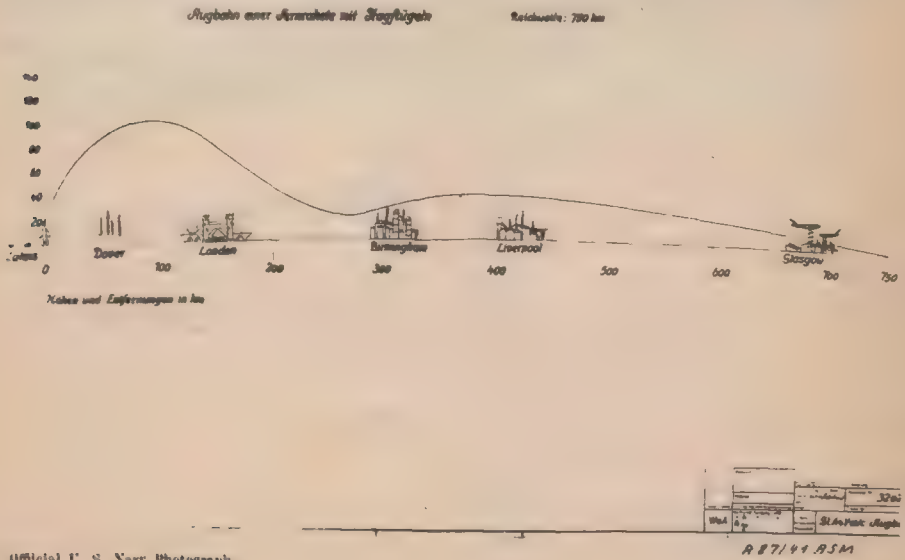
But the more the lecture progressed the more I began to feel a vague yearning for simplicity. Several compression stages and several turbine stages, with six or eight combustion chambers twisted around each other began to look mildly frightening after a while.

No doubt these jet developments were a step forward, but nobody could possibly claim any longer, as enthusiastic aviation writers had so often done, that jet engines were a simplification of power-plant design. Suddenly Schaefer, as if reading my mind, whispered: "Now they are complicated even in schematic diagrams."

Slightly confused and somewhat bewildered and not at all capable of making up our minds about the things we had heard, we left the imposing United States Chamber of Commerce Building where the lecture had been delivered and walked over to F Street. Earlier in the day the Navy had put a mobile exhibit there, for the sake of the last War Bond drive. The exhibit consisted of a Japanese Baka, a piloted German V-1—not put into action for lack of volunteers—and a V-2, mounted on one of those big trucks which had originally been designed for carting whole bridge sections around enemy-ruined territory.

Meanwhile it had grown quite dark and a perfectly round moon rose in the East. It was purely an accident, but the big 46-foot rocket, lying sloping on the bridge section truck, raising its nose some seven or eight degrees, pointed directly at the rising moon. It looked "target for tonight." One should be immune against sudden thoughts which spring up on such occasions; but just for those who aren't either I report that, almost without any volition on my own part I said: "Still in our lifetime."

A few days earlier I had received



Official U. S. Navy Photograph

Profile of the path of a winged version of V-2 the Nazis planned to employ against strategic targets in Britain at ranges up to 750 km.

Rudy Arnold

Meet Gorgon, a rocket type guided missile with a seeking head, meant for interception. Of plywood, its top speed is 500 mph.

a pre-print of a lecture delivered on the 1st of November, 1945, in London before the Royal Aeronautical Society by W. G. A. Perring, F.R.Ae.S., entitled "A Critical Review of German Long-Range Rocket Development." This publication was then, and at the moment of writing still is, the most complete release on V-2. I had read it by the time I saw the actual specimen, and while reading it I had been impressed with many things. Most of what impressed me was coupled, in one way or another, with the size of the rocket, its 46-foot length, its 12½ tons of take-off weight, its rocket motor of 60,000 pounds thrust.

What had impressed me even more was the fact that a lot of difficulties connected with the design and construction of large rockets had apparently turned out to be not as difficult as originally anticipated. If, some ten years ago, somebody had asked me what maximum thrust I would expect of a single rocket motor, I would have guessed at 5000 or 6000 pounds. The V-2 motor produces 60,000 pounds at sea level and 69,000 pounds at an altiude of twenty miles, partly because it seems to have been designed for efficient

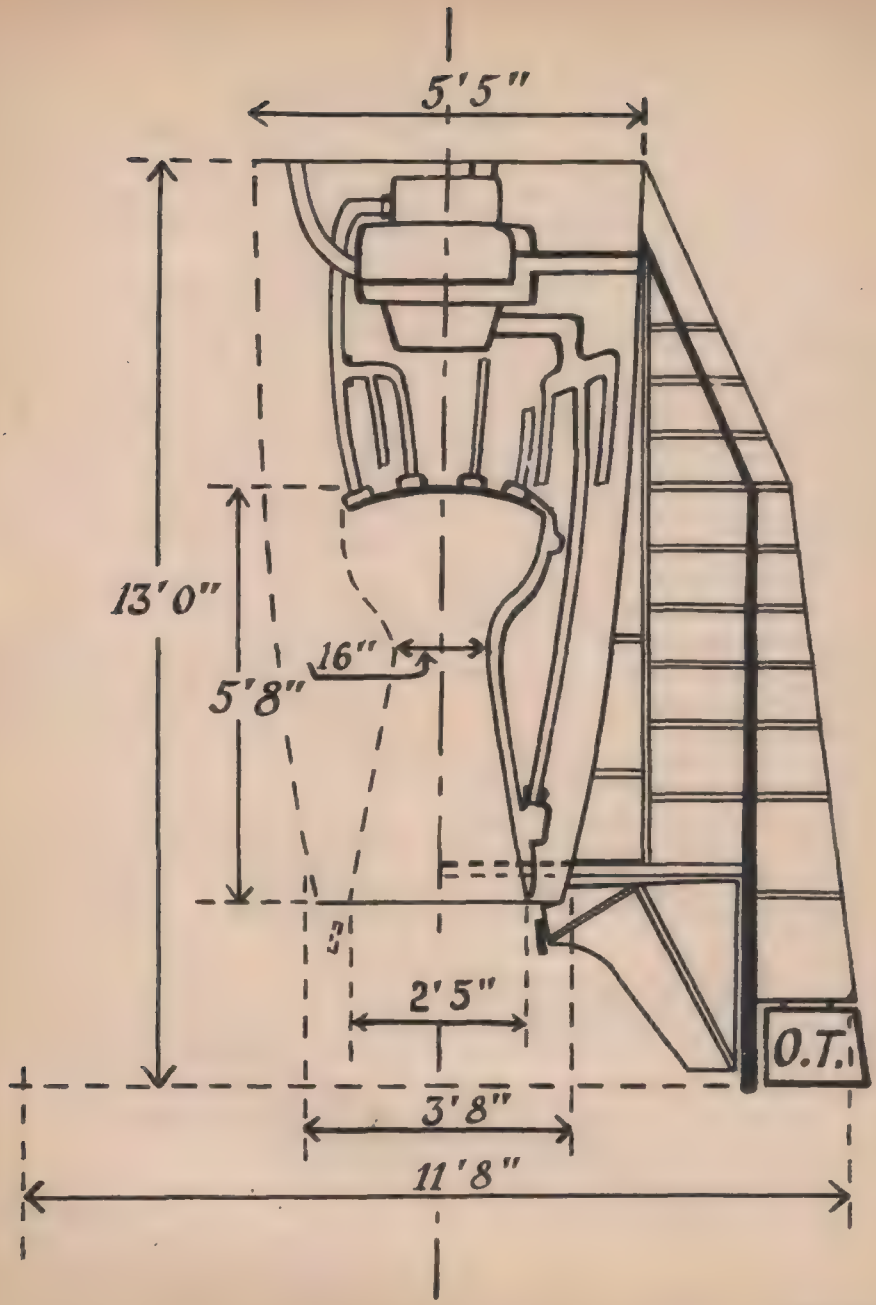
operation at higher altitudes, but mostly because the lack of external air resistance enables the exhaust blast to emerge from the nozzle with a higher exhaust velocity.

In short the whole V-2 venture of the German army proved that large-size rockets for liquid fuels were not so difficult to build and that V-2 itself is only the veriest beginning—comparing what can be done about rockets with Fulton's first steamboat and today's *Queen Mary*. It was equally gratifying to find out in what a comparatively short interval of time the Germans had been able to arrive at a 12-ton rocket. I had always preached that the building of large-size liquid fuel rockets was merely a question of capital expenditure and nothing else. I had been mistaken merely in the asumption that it would be American money which would be spent for this development.

But the perusal of the report on V-2 and the—because of circumstances—rather superficial inspection of the specimen also harbored a number of surprises of a quite different kind. Except for the rocket motor itself and the auxiliary machinery a certain carelessness of design was quite unmistakable. Again and again there would be glaring instances of a hardly professional lack of attention to detail. It looked—and presumably with good reason—as if everybody had decided at one point to get the thing over and done with. There can be no doubt that political pressure resulting from the heavy military reverses experienced by the German army years before the final collapse caused V-2 to be sent to the production lines before it was quite ready for that step. Obviously thoroughness had been thrown to the winds at one point. V-2 carried several hundred pounds of useless fins and another quarter ton of useless metal in other parts.

Nor was the workmanship of the rocket as a whole especially remarkable. It did not show any surface finish worth mentioning and the attachment of the outer skin was poor in places. The way the servicing panels of the instrument compartment were attached and fitted smacked of a job done by the local tinsmith at a time when he was in a hurry. Of course, many of these things could be—and presumably were—excused on the grounds that the rocket was of necessity expendable, that more careful workmanship was not required to accomplish the job for which the rocket was designed. But if the rocket were used for a different purpose all these, in themselves probably minor points, would count heavily.

The Germans were not unaware of these shortcomings. The man who created V-2 by translating Professor Oberth's theory into engineering practice, Count Wernher von Braun, freely admitted after his capture that he did not think his product as wonderful as the German Ministry of Propaganda had made it out to be. He said that, in his opinion, V-2 was at the same state of development when it was put on the production lines, as was the airplane when it was pressed into com-



Willy Ley

Willy Ley

Fernrakete A-4 V-2.

Relative dimensions of the rocket motor that powers V-2 show up in this scale representation of its more important features of design.

bat service during World War I.

Presumably an experienced airplane experimenter, if given the time, the facilities and the raw materials, could have built an airplane superior to the production models of 1917 and 1918. Certainly it would be possible to improve considerably over the production model of V-2 right now and without additional research, provided the production facilities were available.

It is needful to say as early as possible in any such discussion that the word "improvement," standing by itself, is pretty meaningless. In order to make sense it has to be specified what kind of improvement, improvement in what direction, improvement for what purpose. The Germans invented V-2 for long-range bombardment and used it as long-range artillery. Because of this purpose they had to solve their problems in the direction of maximum payload and maximum range. Other things like fuel economy had to be treated as secondary considerations unless they had a very direct bearing on the main problem.

If V-2 had been designed as an instrument carrier for high altitudes, things would have been different. If it had been designed as a man-carrying rocket also dedicated to high-altitude exploration, still another set of problems would have come up. What would have been an improvement in one case might well have been detrimental in another.

The improvements I had in mind when I said that V-2 could be considerably improved right now are aimed in the direction of a high-altitude research instrument.

When V-2 was still under development at the German Rocket Research Institute at Peenemünde on the island of Usedom which fronts the Bay of Stettin it was not called V-2. Nor was the institute referred to as a rocket research institute. The institute was called HAP and if somebody asked what that abbreviation meant he was informed that it was the initials of *Heimat Artillerie Park*—Homeland Artillery Park. And the big project was project A-4.

A-4 stood for Aggregate No. 4 and there was a reason for that number. When Count von Braun had left the experimental grounds of the German Rocket Society in 1932 he had joined a Projectile Research Group of the German army, headed by General—then Colonel—Dornberger. The work was done on the artillery proving ground near Kummersdorf, not far from Berlin.

There Count von Braun designed his first rocket, Aggregate No. 1. It was finished in 1933, had a length of 4 ft. 7 inches, the largest diameter about 12 inches and a total weight of 150 kilograms—330 pounds. Like most models bearing the number 1, the A-1 rocket ended up by being discarded in favor of model number 2. A-2 was not larger than A-1 but different in design. Its rocket motor could develop a thrust of 300 kilograms and endure full fuel flow for the total amount available in the tanks which lasted for 16 seconds. Several

models of A-2 were taken to the small German island of Borkum in the North Sea and tested. They attained altitudes of two kilometers, about 6500 feet.

Some time after that HAP was founded and A-3 became its first project. It was a long step from A-2, the new rocket stood 25 feet tall at take-off and its largest diameter 2½ feet. Its take-off weight was 750 kilograms, the rocket motor developed a thrust of 1500 kilograms or 3300 pounds. The fuel supply lasted for 45 seconds and carried the rocket to 40,000 feet in a vertical ascent or to a distance of eleven miles when the controls were set for an angle of 45 degrees. A-3 was the first rocket in all history with control vanes touching the exhaust blast.

The design of A-4 grew through the years of 1938 and 1939. Actual construction began in 1940. There must have been hundreds upon hundreds of ground tests, the first A-4 to be actually fired was fueled on July 6, 1942. It probably was one of those summer days which are so typical for the Baltic coast in the vicinity of Peenemünde, with sea and sky of such an equal deep blue that it needs good eyes to tell the horizon line, with a light, cooling breeze producing a few feathery white catspaws on the sea, and with a few feathery white clouds in the sky which look as if they were the same.

Number 1 of the A-4 rockets exploded three feet above the ground with such violence that the testing site was destroyed. Number 2, some time later, exploded, too, and with equal violence—but at an altitude of 16,000 feet. So did Number 3. Number 4 was ready in October, 1942—and covered a distance of 170 miles without mishap. Number 5, some days later, also performed as expected, except that it could not be found afterwards.

Not a single one of the next thirteen rockets gave the slightest bit of aid and comfort to the enemy. Some exploded in midair, some broke in two first and exploded afterwards, some just failed to work. The spell was broken by Number 19, from then on most rockets performed. The term "most" should be understood in the sense in which it would be understood if the sentence read: "most of the representatives voted for the measure"—there were still twenty per cent failures in the next hundred rockets. And later on in field use the percentage of failures varied between ten and forty, depending mostly on the age of the rockets at the time they were fueled and fired.

It was one of the early test shots which finally gave the secret of the long-range rocket away. The Intelligence services of the Allies knew that rocket experimentation was going on near Peenemünde, but details were furnished by the Germans themselves. They arrived in the form of two tons of fragments, most of them small, which showered a few square miles of a Swedish countryside. The pieces were carefully collected and turned over to British Intelligence. There was a lot missing and the job was a kind

International News Photo

A spaceship takes off! V-2 rises majestically from the firing stand and departs for the wide blue yonder

of engineering equivalent of the restoration of an extinct dinosaur. But the thing could be pieced together. That rocket had exploded some forty miles above Sweden in June 1944. When the first A-4 rocket, renamed V-2 by the German Ministry of Propaganda and Public Enlightenment, crashed into a London suburb on September 8, 1944, the British could fill in the missing pieces in their diagram.

The total number of A-4 rockets fired operationally was 4300. Of these 2000 crossed the English Channel and 1230 hit the target which was the area of Greater London. Most of the A-4 rockets not fired at London were used against Antwerp.

If you fire a projectile vertically into a vacuum it will climb to a height of $v^2/2g$ where v is the muzzle velocity of the projectile and g the surface gravity of the planet from which it is fired. If you fire the same projectile with the same muzzle velocity at the angle of maximum range—45 degrees elevation—the distance covered by the projectile will be v^2/g or twice as far as the altitude it reached during a vertical shot. Actually it will be a little more since the planet's surface is not a plane, but for all ordinary purposes this correction is small in value if you work from a fair-sized planet. The altitude to which the projectile will climb during the shot over maximum range is $v^2/4g$ or one quarter of the range.

For a planet the size and weight of Earth—assuming that a planet of

International News Photo

in this sequence. In the last picture, upper air winds at differing levels have put kinks in the vapor trail.

such mass could be without atmosphere—and for a muzzle velocity of one mile per second these formulas work out to the following figures:

	Kilometers	Miles
Vertical Shot	128	80
45° maximum range shot	256	160
Peak of trajectory	64	40

I used the figure of one mile per second for the muzzle velocity not only because it is a nice round figure, but it so happens—very neatly for purposes of comparison—that the Paris Gun of 1918 had that muzzle velocity and that the maximum velocity of V-2 was also one mile per second. From those examples we get two sets of actual performance figures which look as follows:

PARIS GUN:	Kilometers	Miles
Actual Maximum range	128	80
Actual Peak of trajectory	48	30
Vertical Shot (hypothetical)	64	40
A-4 ROCKET:		
Actual Maximum range	352	220
Actual Peak of trajectory	96	60
Vertical Shot (hypothetical)	176	110

Comparison between the theoretical table and the table for the Paris Gun shows first that air resistance

sliced an even fifty per cent off the range. The actual maximum range was 80 miles; without air resistance it would have been 160 miles. And the peak of the trajectory was 30 miles above sea level while theory places it at 20 miles for an 80-mile range. Of course, there are very valid explanations. The loss of fifty per cent of the range was due to air resistance, the increased peak altitude was the result of the fact that the elevation of the Paris Gun was 55° instead of 45°. For short-range weapons such an elevation would reduce range. But for very long-range shots the higher elevation actually *is* the angle of maximum range because the projectile will travel for a greater portion of its trajectory through layers of the atmosphere which offer less resistance.

The difference between actual curvature of the Earth and the plane assumed in ballistic theory amounted to about one-third of a mile in this case. I mention this figure merely to show how little need for this correction exists in practice, the dispersion for shots over such range amounted to three and four miles.

If we compare the first table with the table for the V-2 Rocket, we are first struck by the fact that the rocket figures are larger than theory —which neglects all air resistance— seems to permit. Instead of a maximum range of 160 miles we find a range of 220 miles * and the peak of the trajectory which should be 55 miles turns out to be 60, while theory seems to permit merely 40. And all this in spite of the fact that everything is based on the same velocity of one mile per second.

The point is that you have to add some twenty-two or twenty-three miles to all theoretical figures in the case of the rocket because the velocity of one mile per second was reached at that altitude, some 70 seconds after the rocket left the ground. The powered ascent of a rocket compares to the travel of the projectile inside the gun barrel. The length of the gun barrel is negligible when compared to the range —even the 100 foot barrel of the Paris Gun would not make any measurable difference for a shot over 80 miles—but the powered ascent of a rocket is big enough in iltself to count heavily. V-2 might be said to have been fired from an invisible gun barrel twenty-two miles long. That counts.

An additional advantage of the powered ascent of a rocket is that the "barrel" does not have to be straight. In order to avoid the excessive air resistance caused by the dense layers of the troposphere— the first seven miles above sea level —a rocket should take off vertically no matter where it is supposed to go. The Germans made V-2 do that, the path was then slowly curved into the right direction and angle. Here is how it looked:

Direction of longitudinal axis of V-2:

* The range of 220 miles was actually observed but it was not the norm. Most of the V-2 rockets fired against England averaged between 180 and 190 miles so that the reliable operational range of the weapon was 185 miles, with a dispersion as large as 15-20 per cent of the range.

Alexis Dawydoff, Technical Editor, *Air Trails And Science Frontiers*

Interior of V-2's assembly hangar at White Sands. Missing parts were supplied by General Electric and other American manufacturers.

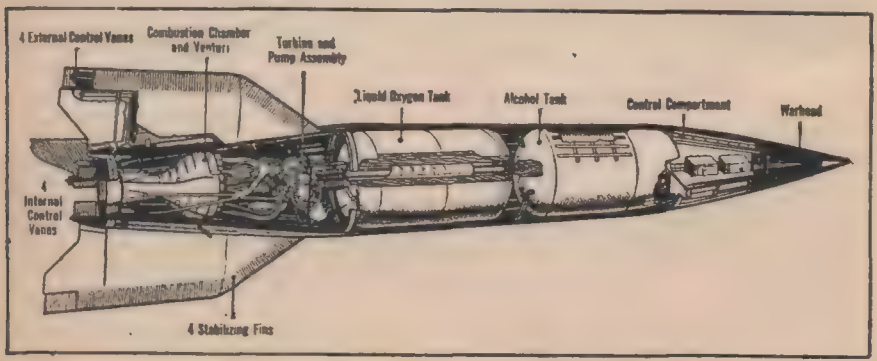
Seconds after take-off	Angle:
0.0	90°
2.0	90°
8.5	80°
11.5	76°
28.5	60°
47.0	46°
52.0	44°

The effective acceleration at take-off was, with a take-off weight of 12.5—metric—tons and a motor thrust of 27 tons, 1.15 *g*. During the last second of burning, the seventy-first second, when the weight of the rocket had fallen off to 8900 pounds and the motor thrust gone up to 69,000 pounds, a small fraction short of 8 g. When the rocket had attained the proper velocity for the range for which it was intended, the fuel flow was shut off in two stages. First it was reduced to one third of its normal full-flow value

and two or three seconds later to zero. In the early models this was done by radio from the ground, in the later models there was a special device, an integrating accelerometer —known to the Germans as *Integrationsgerät*—which could be pre-set for the desired velocity and operated the valves automatically.

The remainder of the trajectory did not differ from that of a projectile. Five minutes after take-off it hit the ground, traveling at about half of its maximum velocity. During the descent the rocket was heated appreciably by air resistance. The Germans had expected this and tested the heat generation experimentally by inserting a large number of metal plugs of known melting points into the outer skin of a rocket which was test-fired. They found that the heat of the outer skin, at no time during the completion of the long-range trajectory and at no point on the rocket's surface exceeded 650° centigrade. The British, on the other end of the trajectory, made metallurgical examinations of pieces of skin of V-2 rockets and found in that manner —before they had access to the German test reports—that no part of the rocket, excepting, of course, the motor, had been heated above 630° centigrade.

The steel construction of the rocket could stand this amount of heating without any difficulty, the designers, therefore, did not have to pay too much attention to it. It merely influenced the choice of the explosive for the warhead. They used *Amatol* for this reason, a well-known mixture of TNT and ammonium nitrate which is highly resistant to heat. This eliminated the danger of explosion in midair except for the possible, although not too probable, case that both fuel tanks had sprung leaks and that residual fuel could mix with residual oxygen and be exploded by the heat generated during the descent. This may have happened in the case of the rocket that exploded over Sweden.



Willy Ley

This overall diagram as redrawn from the first British release shows the salient features of the whole device in perspective. The internal control vanes mounted in the gas stream are of graphite.

The construction of the rocket resembled that of an airplane fuselage, consisting of a number of ring-shaped members held together by longitudinal stringers and covered with a skin of sheet steel. Total length, including the warhead, was 46 feet, largest diameter of the body 5 feet 5.3 inches, diameter measured over the fins 11 feet 8 inches. The main members of the stabilizing fins were strong enough so that the fully fueled rocket could stand upright on its fins for take-off.

Counting from the top down the rocket consisted of the following sections: Warhead, instrument bay, fuel tanks and power bay. The warhead was made of 8 millimeter —slightly below ¼-inch—sheet steel and was equipped with three fuses, one on top and two in the base. It was approximately conical in shape, 5 feet 11 inches tall and weighed, when filled with *Amatol*, 2,150 pounds.

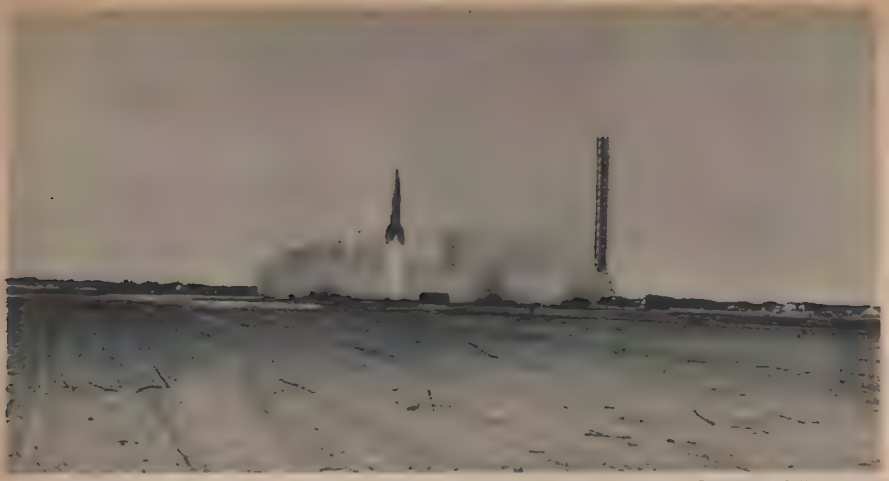
Next came the instrument bay, 4 feet 8 inches long and holding the radio—later the *Integrationsgerät*—and other instruments as well as a quantity of compressed nitrogen for operational purposes. The framework of the instrument bay et cetera weighed 325 pounds, the instruments and their mountings 570 pounds and the nitrogen bottles and fittings 80 pounds, a toltal of 975 pounds.

The tank bay comprised the bulk of the rocket, in volume as well as in weight. It was 20 feet 3.5 inches long, comprised the section of maximum diameter and weighed empty 1795 pounds. The alcohol tank was on top, the alcohol standpipe leading downward through the center of the oxygen tank. The alcohol tank weighed, with fittings, 235 pounds, the oxygen tank, with fittings, 375 pounds.

Both tanks were covered by a big blanket of glass wool for purposes of heat insulation. Arthur C. Clarke sent me a sample; it was the coarsest glass wool I have even seen. Of course that insulation was really required for the oxygen tank only, apparently the one big blanket was a concession towards easier manufacture. At any event the glass blanket and the shell structure around the tanks weighed 1185 pounds. The oxygen tank, when full, held 10,940 pounds of liquid oxygen, the alcohol tank held 8370 pounds of alcohol—water mixture. The fuel was "150 proof" in the language of the liquor dealer, or seventy-five per cent by volume. The total fuel load, therefore, was 19,310 pounds.

When filled and left standing about two kilograms—4.4 pounds—of oxygen were lost through evaporation for every minute of delay. It was important, therefore, to "fill and fire." To make a rocket ready for firing took several hours at first. That time was reduced to half an hour after a definite firing routine had been established. The filling operation itself was reduced to 12 minutes.

The power bay had an overall length of 14 feet 7.5 inches and had a total weight of 3044 pounds. The rocket motor itself weighed 1025 pounds, the structure of the



International News Photo

Careful precautions are in force at White Sands when V-2 roars skyward on its jet of flaming gas. Dust shrouds the site in this view.

power bay 410 pounds. The auxiliary power unit weighed 880 pounds, the auxiliary fuels 400 pounds, the mounting for the auxiliary power unit 260 pounds and the necessary pipes and valves 70 pounds.

What has been referred to as "auxiliary power unit" in the preceding paragraph was the invention which made A-4 possible: the fuel pumps. In a comparatively small liquid fuel rocket the simplest and all-around most convenient method of getting the fuel and the liquid oxygen from the tanks into the rocket motor is by putting nitrogen pressure on the whole tank. When a rocket is large that simple method might still be convenient, but it is no longer efficient. A tank which is to stand an internal pressure of, say, 300 pounds per square inch has to be fairly heavy. On that order of magnitude it is weight-saving to have thin-walled tanks and to pump the fuels into the rocket motor.

The tanks of V-2 were not completely without pressurization. They were pressurized to about 20 pounds per square inch, partly to assist the fuel pumps in their work but mainly to prevent the emptying tanks from collapsing and springing leaks. Pressurization of the oxygen tank was simple, the oxygen provided its own pressure, while the rocket was standing excess evaporation gases had even to be siphoned off. Later on, when the rocket was underway, a heating device, operating from the pump-driving turbine exhaust, maintained a sufficient rate of evaporation. In the alcohol tank ram pressure of external air through a pipe leading forward was used, a slightly unsafe method since that would carry some atmospheric oxygen into the alcohol tank. After forty seconds counting from take-

off there was not enough external air to provide enough ram pressure, then the intake pipe was sealed off and nitrogen pressure substituted for the remainder of the operational period.

The fuel pumps were centrifugal pumps, the impeller of the alcohol pump measuring 13.45 inches of diameter, that of the oxygen pump measuring 10.55 inches in diameter. Both operated at 5000 r.p.m., the delivery pressure of the alcohol pump amounting to 370 pounds per square inch and the fuel flow to 125 pounds per second. The delivery pressure of the oxygen pump was 350 pounds per square inch, the flow 160 pounds per second.

Both pumps were driven by a steam turbine of an estimated power of 680 HP at 5000 r.p.m. The diameter of the turbine rotor was 18.5 inches. The pumps and their driving turbine were mounted together forming one unit with the turbine in the center and the pumps on either side.

Surprisingly the turbine was not operated by means of small by-pass standpipes from the main fuel tanks, presumably because the turbine would have been unable to stand the heat of alcohol burned in pure oxygen. Instead the turbine made use of the reaction of hydrogen peroxide —H_2O_2—with sodium permanganate. Three hundred seventy pounds of hydrogen peroxide—code-named *T-Stoff* by the Germans—were carried in an elliptical steel pressure tank and 30 pounds of permanganate in a small cylindrical steel tank. By means of compressed nitrogen they were fed into a mixing and reaction chamber and the resulting gases drove the turbine. The fuels coming from the pumps were passed through distributor valves to enter the rocket motor.

The 1025 pound-weight, 60,000 pound-thrust 7000 feet-per-second exhaust velocity rocket motor, which consumed 275 pounds of alcohol and oxygen per second was made of mild steel plate, 8-millimeter thick, formed in sections and welded together. The top cover of the rocket motor was equipped with eighteen so-called burner cups, arranged in two circles, an outer circle of twelve and an inner circle of six. The oxygen, after having passed the distributor valves, entered the burner cups directly. The alcohol was pumped into the cooling jacket which surrounded the motor; the fuel also served as a coolant, being mildly pre-heated in the process.

But not all of the alcohol was passed from the cooling jacket into the burner cups, some of it was "spilled" into the exhaust nozzle to provide direct cooling of the inner wall. The cooling proved highly effective, although the temperature of the exhaust gases in the motor nozzle throat—the narrowest part—was over 2500° centigrade the throat wall was never heated beyond 1000° centigrade.

The rocket motor was ignited externally by means of a blackpowder cartridge. When the cartridge burned, the fuel ports were opened, producing a gravity-induced flow of between 20 and 30 pounds of alco-

hol and liquid oxygen per second. But these 20 to 30 pounds of fuels per second, enough to maintain a small airplane in flight, merely constituted a check on whether the motor was burning properly. If the observer was satisfied that it did, he closed an electric contact which started the flow of hydrogen peroxide and permanganate to its reaction chamber, thus setting the turbine and, in turn, the fuel pumps in motion. It took three seconds for the turbine to reach full speed, the amount of fuels entering the motor and, in consequence, the thrust built up almost as fast. As soon as the thrust exceeded the weight, the rocket took off, some seven or ten seconds after the fuel valves had been opened.

The first second or two were the most dangerous part of the whole undertaking. The rocket would lift off the ground ever so slowly, with thrust hardly exceeding weight, balancing on a violent cataract of fire which caused a ground splash sixty feet and more in diameter. On occasion it would hover, but, if the thrust built up to its full 27 tons, the rocket would have an upward velocity of 35 feet per second after a second, with its exhaust nozzle spouting 275 pounds of hot combustion gases per second barely 20 feet above the ground. From then on it continued, adding 35 feet per second every second, with increasing acceleration as the weight of the rocket diminished.

The operator had no influence over the rocket any more beginning with the instant he closed the turbine activating switch. From then on the automatic instruments took over, the pilot and the integrating accelerometer, the one to keep the rocket on its course, the other to add up acceleration periods patiently until the proper velocity was reached. One type of automatic pilot consisted of two electrically driven gyroscopes, one with its axis coinciding with the longitudinal axis of the rocket, the other with its axis perpendicular to the first.

The first gyro provided pitch control, it was made to precess towards the horizontal. The movement was detected by means of a fine wire potentiometer, the output of which was fed into an amplifier and then made to operate the controls through their servo motors. The second gyro detected roll and yaw; as with the first wire potentiometers—two in this case—measured the motion, their output was amplified and then operated the servo motors.

The actual controls were one of the most interesting features of A-4. There were two sets, four so-called external vanes which, when undeflected, formed part of the stabilizing fins. They were constructed in about the manner of the control surfaces of conventional aircraft. The other—internal—set comprised four deflector plates. These, roughly rectangular with a projecting lower end and a triangular cross section, were made of graphite and mounted with metal backing on the round metal disks. These internal deflectors could be inserted into the gas

stream and seem to have acted mainly by being pushed into it. But they could also be turned around the center of the round metal disk and assume virtually any position necessary. Although admittedly of an endurance of not more than a minute they fulfilled all expectations of the designers according to a so far confidential report which has just been released. It has to be kept in mind that the "endurance" of one minute does not mean that all deflectors were worn out even before the rocket had exhausted all its fuel. The deflectors did have to stand the thermal shock and the abrasive action of the gas stream—not to mention its possible oxidizing action—for only a fraction of the full burning time.

The manufacturers, incidentally, counted five graphite rudders as one set even though the rocket carried only four. One spare was provided for each rocket since the rudders were comparatively fragile. For the same reason they were always shipped separately and mounted shortly before take-off. They were highly effective, so effective in fact that there was no need for the set of external vanes.

The external vanes, operating in the slipstream, could obviously not be effective during the early stages of the take-off where control was needed most desperately. They could not be effective for the same reason why control was needed so badly: because the rocket moved so slowly. Neither could the external vanes be very effective when the rocket had passed the, say, ten-mile level because the external air was too thin. Obviously there was a period during the ascent when the velocity of the rocket was high enough, and the air still dense enough, to make the external vanes effective. But the internal deflector plates did equally well at any time since they had the exhaust to work on—hence there was really no need for the external vanes.

The fins and vanes amounted to a surprisingly large percentage of the dead weight of the rocket, mostly because the fins had to support the total weight, with warhead and fully fueled, prior to take-off. The four fins weighed 750 pounds, the servo units—including the small internal controllers—470 pounds and the external controllers and their circuits 115 pounds, a total of 1335 pounds.

This, in outline, is the story of A-4 or V-2.

Now we come to the question of improving upon the wartime production model. Of course we have to state the purpose, and as in the case of the White Sands, New Mexico, experiments which were made with adapted captured V-2s, we'll assume that either high altitude research or simply a high altitude record is the goal.

The first thing we have to do is to get a conception of the mass-ratio of the rocket, take-off weight divided by "weight of arrival." Now the take-off weight of a rocket, called M_o, is the sum of the weight of the rocket itself—M_R—plus the

weight of the payload—M_P, in the case of V-2 the warhead—plus the weight of the fuels—M_F. By adding up the various figures given earlier in the article we find that

$$M_F = 19{,}710 \text{ lbs.}$$
$$M_R = 6{,}750 \text{ lbs.}$$
$$M_P = 2{,}150 \text{ lbs.,}$$

hence M_0 was 28,610 pounds. M_1, the "weight of arrival" ($M_R + M_P$) was 8,900 pounds. The mass-ratio, consequently, was 3.21:1.* A mass-ratio of 2.72:1 (e) would cause the rocket velocity v to become equal to the exhaust velocity c under ideal conditions, i.e., without air resistance and gravity. With a mass-ratio of 3.21 and an exhaust velocity of $c = 7000$ ft/sec., V-2 would have reached a velocity $v = 8500$ ft/sec. Actually it was about 5300 ft/sec. about two thirds of the figure for ideal conditions. It seems permissible, therefore, to work with the formula for ideal conditions in the followng and to expect to obtain two thirds of the results.

Now we'll see first what happens if we simply leave the warhead off, replacing it, for aerodynamic reasons, by an ogival windshield of sheet steel, assumed to weigh 200 pounds.

Then we have $M_0 = 26.660$ and $M_1 = 6950$ and a mass-ratio of 3.83. Theoretically this would lead to a v of about 9500 ft/sec. so that we could actually obtain about 6200 ft/sec. more than with warhead.

But during the description of V-2 we have found a number of spots where dead weight can be saved. We don't need the external vanes and their operating servomotors, we don't need the insulating glass wool over the alcohol tank. The external control circuits weighed 115 pounds, the unnecessary part of the glass wool blanket probably about 200 pounds, and we might well be able to save some of the insulation on the oxygen tank, too. Since such a peaceful rocket can be fired as soon as filled, insulation, while not unnecessary, does not need to be so efficient. Furthermore the rocket is supposed to travel vertically, resulting in a simplification of all controls. All in all we might save another 600 pounds that way, in addition to the 1950 pounds saved by substituting a ballistic windshield for the warhead.

Without even touching the rocket motor and the auxiliary power unit —although weight-saving is clearly possible in the power bay, but that would require additional research which was ruled out—some weight can be saved all the way down, at least another 550 pounds. This would produce a total saving of 3100 pounds. If we allow for 100 pounds of recording instruments, ejected at the peak of the ascent and equipped with a sufficiently large parachute which will open later on in denser air, we have a total weight saving of 3000 pounds. This brings M_1 down to 5900 pounds and M_0 to 25,610 pounds, and increases the mass-ratio to 4.34, producing a velocity of over 11,000

* At first a mass-ratio of 6 : 1 had been reported and since only M_0 was given and M_R mentioned, but neither M_R nor M_F specified this figure had to be accepted at face value, leading to some erroneous conclusions.

ft/sec. theoretically and around 7500 ft/sec. to be expected.

The rocket, after these changes in weight and mass-ratio, should be able to reach an altitude of about 150 miles.

Since we could push the vertical range from 110 to 150 miles by doing nothing more than get rid of some unnecessary weight, we might well wonder what would happen if we paid attention to adding fuel. V-2 carried a 2150 pound warhead —what would happen if that weight-carrying ability were used for additional fuel?

We'll assume that we have used all the other weight-saving methods, like eliminating the external fins, cutting down on insulation et cetera, now we put one ton of tank weight and fuel back in. Then we have, assuming that the weight of the tanks increases by 300 pounds and the fuel weight by 1900 pounds, $M_o = 25{,}610 + 2{,}200 = 27{,}810$ lbs., $M_1 = 5{,}900 + 300 = 6{,}200$ lbs., and the mass-ratio M_o/M_1 becomes 4.48. That mass-ratio will make $v = 10{,}500$ ft./sec. if $c = 7000$ ft./sec. The figure of 10,500 is, of course, hypothetical and has to be reduced by one third in order to resemble the probable actual achievement. Two thirds of 10,500 is 7000, we find that the added ton of fuel did not bring in any advantages, we did a little better by just slicing weight off the production model and then leaving it alone.

It may seem after this as if 150 miles altitude were the maximum that could be accomplished without additional research, research which will either increase the mass-ratio of the rocket, or else increase the exhaust velocity of the rocket motor or, preferably, both.

But the first thing to do would not be so much slicing dead weight off the rocket, but to build another one, a smaller one, which should be easy. Its m_o should be 2200 pounds and its m_1 733 pounds, producing a mass-ratio of 3:1. That smaller rocket, of course, is to take the place of the warhead of the original V-2 and to serve as an upper step.

Now the two or more rockets which are fitted together to make a step rocket all have their individual mass-ratios. But the whole step rocket also has some kind of mass-ratio which will be called "ideal mass-ratio"; not because it is something ideal in the sense of unsurpassable, but because it exists only as an idea.

Oberth evolved a formula for the ideal mass-ratio which reads:

$$\left(\frac{M_o}{M_1}\right)_i = \frac{M_o' + M_o'' + M_o''' + \ldots}{M_1' + M_o'' + M_o''' + \ldots} \times \frac{M_o'' + M_o''' + \ldots}{M_1'' + M_o''' + \ldots} \times \frac{M_o''' + \ldots}{M_1''' + \ldots}$$

(I used the M', M'', M''' marks to denote first, second and third step, Oberth operated with Latin, German and Greek M's. I sometimes wonder what he would have done if he had worked on a four-step rocket, since the Russian M looks like the Latin. . . .)

For the two-step rocket the formula looks far less frightening as:

$$\left(\frac{M_o}{M_1}\right)_i = \frac{M_o + m_o}{M_1 + m_o} \times \frac{m_o}{m_1}$$

in figures:

$$\frac{25{,}610 + 2200}{5{,}900 + 2200} \times \frac{2200}{733} = 3.43 \times 3 = 10.29.$$

The ideal mass-ratio is the result of the individual mass-ratios *multiplied* with each other in the manner given by the formula. Therefore our two rockets, one with a mass-ratio a little short of 3.5 and the other with a mass-ratio of 3:1 produce an ideal mass-ratio of 10.3 to one. For a $c = 7000$ ft./sec.—in both rockets—the upper step attains a final velocity $v = 16{,}500$ ft./sec. theoretically, probably 11,000 ft./sec. actually.

And this corresponds to an altitude of 350 miles.

All this can be done soon.

After this we can go on from there.

THE END.

THE ANALYTICAL LABORATORY

Our regular An Lab reports as follows:

Place	Story	Author	Points
1.	The Chronicler (I)	A. E. van Vogt	2.32
2.	Assumption Unjustified	Hal Clement	3.19
3.	Chaos Co-ordinated	John MacDougal	3.38
4.	False Dawn	A. Bertram Chandler	3.51
5.	To Still The Drums	Chan Davis	4.22

The high point scores, and close grouping of the scores indicates the fact that the voting was scattered, with wide disagreement as to order of preference.

THE EDITOR.

ATOMIC WAR

For some reason which passeth understanding, a first-rate atomic war story, "The Murder Of The U. S. A." by Will F. Jenkins—long favorably known to science-fictioneers as Murray Leinster—is being advertised as a murder mystery.

It is a mystery in its way—the mystery of just which nation sent the atomic rockets that wiped out every major city in the country—but left the hidden American atomic rocket launching sites looking for the murderers, with all their launching tubes ready to roar, and no known enemy to hit!

Crown Publishing Company of New York published it, but you can get it through your local bookstores. *Not* through Street & Smith.

COMMAND

BY BERNARD I. KAHN

No matter how good a machine is, or how well designed, if human beings are supposed to operate and service it, a psychotic can make it deadly.

Illustrated by Orban

Lieutenant Nord Corbett adjusted his freshly pressed uniform jacket over his thick, broad shoulders, checked to see if the jeweled incrusted wings were exactly horizontal with the first row of spatial exploratory ribbons before entering the wardroom. He well remembered, when he was a junior officer, how the sight of a well dressed, impeccably neat commanding officer, no matter how long they had been spacing, maintained the enthusiasm, confidence and morale of the officers and men.

The wardroom looked like a trimensional pictograph advertising the dining salon of a billionaire's

yacht. Soft light from the curving overhead ricocheted from the gleaming, satiny pandamus wood lining the bulkhead, glanced on the spotless linen, flickered on the silverware like liquid flame. In the center of the elliptical table was his own donation to the officers' mess: a massive stand of carmeltia; the fabulously valuable, deathless, roselike flower from Dynia.

He enjoyed dinner with his officers. He refused to pattern himself after other officers of his same class, who as soon as they were given a command, no matter how small, begin to live a life of lofty solitude. They felt such eremitic behavior would automatically make them revered, feared and admired. The majesty that went with command, Lieutenant Nord Corbett well knew came from mutual respect and not from living in a half world of distant glory.

He quickly noted as he sat at the head of the table, there was still no trace of irking boredom on the alert faces of his ten officers. He looked for evidence of dullness every night at this time. An officer bored with the monotony of spacing was a terrible hazard because he could easily infect others with his own morose discontent.

The steward was at his elbow. From an intricately carved, large silver bowl he pulled a shining metal can, nested in ice. "A lettuce and tomato salad, sir?" Then apologetically, "That's all we have left now."

Nord Corbett nodded. The salad as it emerged from the can looked garden fresh, even to tiny beads of moisture on the crisp leaves.

Nord looked down the table at Ensign Munroe, finance and supply officer. "Fresh canned stores are about gone now, aren't they?" He ladled dressing on the bright green and red vegetables.

"Yes, sir. We'll be on dry stores in about another week," Munroe answered, "unless of course we pass a ship going Earthwards with fresh food."

"Then we'll be on them for the rest of the trip," Nord announced, "we won't pass any ships until we approximate Lanvin."

"We'll only have to eat dry stores for about five or six more months;" Ensign Lesnau, the astrogation officer, prophesied.

Hardman, the executive officer, chuckled. "Did you hear that, gentlemen? Please note, Mr. Lesnau announces an ETA for Lanvin plus or minus one month. I'd suggest, captain," he looked at Nord, "you might have Dr. Stacker teach him astrogation."

The laughter that circled the table at the thought of the space surgeon teaching astrogation was as euphoric as a synthetic comedy. Even after one hundred and two days of spacing he still couldn't believe it; the warm thought cloaked his mind these smiling officers were on his first command—Terrestrial Spaceship *FFT-136*. Their holds were filled with agricultural supplies from the Colonial Office on Earth to Lanvin: Planet IV, Sun 3, Sirius System.

His feeling of responsibility for the safe execution of this task was like the joy of a father with a new son.

"Captain," Hardman interrupted his reverie, "you missed a good story. Just before dinner, Munroe was telling me about the most original crime on earth."

"You mean in space," Munroe corrected; he turned to the captain. "My brother tells the story that when he was junior instrument officer on the *Explorer II*, some loose minded spaceman held up the paymaster when they were five light-years from the nearest planet. He knew he couldn't get off the ship with the money. He just thought it would be a good idea."

"Well, it would be a good idea, if he could get by with it," Nord admitted. "Think how much currency those big ships carry. It would make a man fabulously rich."

"Not just small ships. Do you have any idea how much I have in my safe for the District Base at Lanvin?" Munroe asked.

Bickford, the air officer, leaned forward eagerly. "How much do you carry?"

"I've got a million stellars!"

"A million stellars!" Bickford's pale, blue eyes almost extruded. "Why, that's a hundred million dollars."

Munroe nodded. "Captain, Mr. Bickford knows elementary finance. Why can't he be supply officer for a while and let me be air officer?"

"That's a good idea," Lesnau thought aloud. "I'll be space surgeon, too. A complete rotation of all officers. I've been worried about how Mr. Bickford handles the air anyway. He's careless with our chlorophyl. You know air is rather important to us."

"That last is a super-nova of understatement," Dr. Stacker announced.

Bickford leaned across the table, his almost colorless, pale-blue eyes were like tiny, venomous slits. "What do you mean I don't handle the air properly?" His voice was a rasping growl.

"Now, Mr. Bickford, don't get spacey," Nord Corbett cautioned softly. "You know you were only being kidded."

"Don't like to be kidded about my detail," he answered testily. "Go on with the story." He jerked his thin head towards Munroe.

"That's about all there was to it. Of course he was caught and sent to the hospital." He turned to Dr. Stacker. "What kind of illness is that anyway?"

The space surgeon put down his fork. "I would diagnose such a case as being a psychopath."

"Just what is a psychopath?" Nord asked.

"A psychopath is a person with a mental defect which prevents them from learning by experience. Such personalities are usually brilliant, able to learn readily, but when it comes to living with others they are social failures. They are like children, mere emotional infants. Their conduct is ruled solely by impulse. They will think over an

idea for a second and then act without considering the consequences to themselves or others. The professional criminal, the pathological liar, the billionaire's son who is repeatedly fined for dropping his yacht into a city, the swindler, kleptomaniac, pyromaniac and moral degenerate are all psychopaths."

"What causes them?" Nord inquired, "and why let them on ships anyway?"

Stacker sighed. "I wish I could answer it all for you." He pulled a package of cigarettes from his pocket, touched the stud on the label, pulled out a lighted cigarette. He inhaled deeply. "The psychopath can only be explained as a vestigial remnant of man's evolutionary development. It is normal for an infant to live solely by impulse, but as mentality develops he learns to make adjustments to life without the origin of too many conflicts. If, however, we lack the ability to learn how to live with others then we will act as a very intelligent animal would act." He flicked ashes on the tray. "Just remember, captain, it is a mental condition which is a stage in man's phylogenetic development."

"Well, how can you tell a psychopath from a normal lug?" Hardman interposed.

"That's easy," Lesnau broke in, "we're not normal. Those on Earth are. If we were normal, do you think we'd be out here ten light-years from home?"

"The files in the Bureau of Spatial Medicine," the space surgeon answered Hardman's question, "maintain accurate records of all illnesses, arrests, domestic difficulties and any other symptom of maladjustment. All ships have physicians aboard who are trained in psychiatry. We make every effort to keep the Service free from the danger of the psychopath."

"Why are they so dangerous?" Hardman asked with a laugh. "Seems to me they are rather absurd."

"I can see the danger," Nord said slowly. "I wonder how much of an item they are in the cause of ships that don't return?"

"I would say they were a tremendous factor," the medical officer answered. "Think how easily one man could wreck this ship. If he gained access to the tube banks, he could substitute a worn tube and throw our astrogation out of kilter. If he got into the chlorophyl banks, he could infect them, and cause asphyxiation, if he could gain access to the bleeder valves he could release all our air into space. If he kept one suit of armor, he would then control the ship," he paused, looked around the table, "and be rich for life."

Hardman looked at the captain. "I hope you keep all the keys around your neck." When the laughter subsided he addressed the doctor again. "Are all men carefully checked?" He indicated Bickford with a nod. "I mean men like political appointees such as Mr. Bickford."

Bickford's pointed chin quivered angrily. "What's the matter with my mind?" He snarled with trembling fury. "Just because I'm not a graduate of the Spatial Academy is no reason to pick on me." He pounded the table angrily. "My cousin who is manager of Synthetic Air got me this job. I was given a highly specialized course in air management." His pale-blue eyes glared at Dr. Stacker. "Just because you silly space surgeons didn't have any reason to examine me doesn't mean my mind isn't as good as yours. You're all just jealous because I have rich relatives. Well," he laughed hysterically, "my mind is just as good as anyone's at this table."

The officers sat stiffly erect in embarrassed silence as they pretended to ignore Bickford's uncalled for, infantile expression of anger. They waited, fumbling with the silverware, gaze fixed on the waxen roselike flowers in the center of the table. The wardroom was so quiet that when one of the stewards placed a serving spoon in the dessert bowl, the click of the silver was startlingly explosive.

"I don't think there is anything the matter with your mind; nor does anybody else." Nord eased the gathering tension. But he felt cold on the inside, as if Pluto's turgid bitter winds were blowing out from his body and through his clothing. His hands and feet felt cold, even his brain seemed frozen as he watched Bickford's thin fingers pluck for a cigarette.

He turned to Dr. Stacker, who was observing the air officer with clinical detachment. "You're the ship's athletic officer, who should I put my money on tonight?".

"I won't commit myself."

"Gentlemen, shall we go on the recreation deck and watch the semifinals? Cooks, stewards and waiters are expected to beat the ship's repair force. It's going to be a good game of laska ball."

Laska ball was an extremely fast, excellent exercise. It was a modified form of basket ball, played on an elliptical court in which the captains could control the location of their team's basket. It was a well adapted sport for the limited recreational space of small ships.

Nord Corbett forced himself to sit through the first half of the game, but not even the electrical speed of the game, the rocketing ball flashing through the oscillating, flickering basket could remove his vague apprehension.

A cold cloud of worry shadowed his mind until he fell asleep.

At 0500, an hour before his usual rising time, Latham, Officer-of-the-Watch, called him.

"Captain, the lattice shows a small cloud of meteoric dust approximately seventy-five thousand kilosecs in diameter. The density is point zero zero four. I get a spectral classification of Fe dash one-three-nine-four dash alpha nine three delta over six. It is located seventy-two light-minutes from our course at one thirty-six degrees above the axial plane.

May I have your permission to decelerate to chart the cloud?"

"I'll be out in a few minutes."

He dressed himself quickly with smooth fluid motion. He paused for a moment before opening the panel leading from his flight quarters to the captain's gallery. Visions of his vessel's sleek, silver sides and streamlined length washed the background of his mind like a welcome dream. The Bureau of Ships called it a Dispatch Freighter, but no captain commanding a mighty thousand meter exploring battleship would ever experience the soul-satisfying thrill his ship filled him with. A wave of pure contentment filled him as his eyes ran over the narrow welded seams of the ivory-dyed bulkhead. He paused there to listen to his ship: the soft whisper of the muffled air ducts was as soothing as a muted lullaby. The thin, tiny creak of the outer hull responding to its airless environment was as thrilling as a triumphant, stellar symphony. A frown of perplexity flickered between his gray eyes as he sniffed the air.

The atmosphere seemed slightly tainted. It lacked the heady, tingling, euphoric quality the conditioners normally imparted to the ship's atmosphere. One of the tubes working the negatron must have blown during the night. He realized he couldn't depend on Bickford and that he would have to be watched closely. The thought flashed through his mind of the consequences if Bickford were to be careless. What if he got sloppy and something did go wrong with their air? He had once seen the results of slow asphyxiation in an attack transport. He forced the unwelcome memory from his mind.

He stepped out on the gallery.

"Good morning," Nord said as the watch officer snapped to attention.

Three meters below him the helmsmen were bent over the green-lighted circular telegator screen. The tiny red and amber lights over the instrument banks imparted a soft, restful gloom to the darkened bridge.

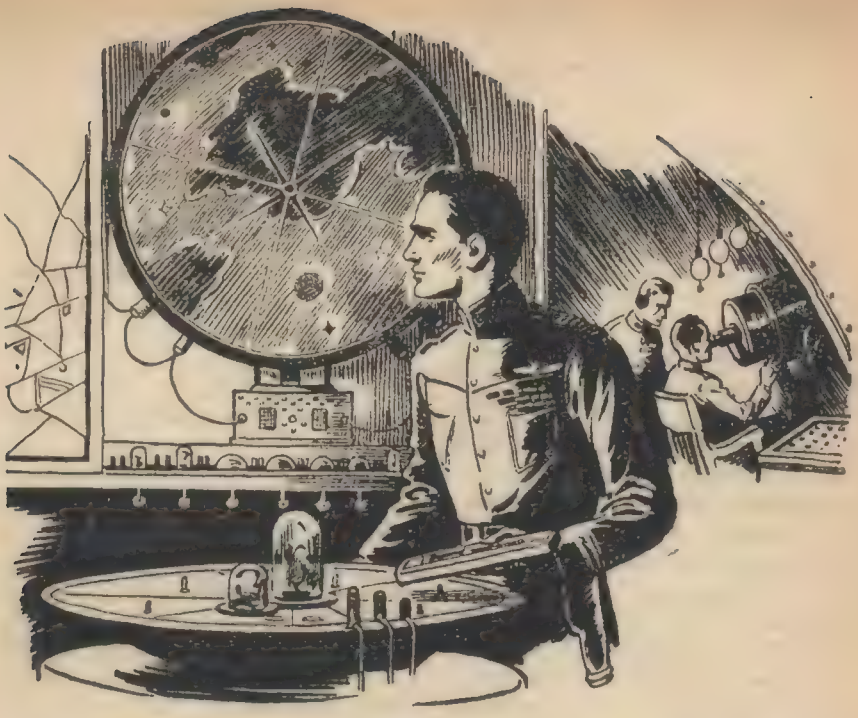
He walked the length of his gallery. On the right brushing his sleeve were the telepanels: the spy plates hated alike by officers and crew. The plates which brought him visual contact with all compartments of the ship and which he never used except in drills. On his left at waist high level were the master's meters, duplicates of the instrument banks on the bridge deck below.

'Midship, in front of his own telegator screen, he paused, adjusted the magnification of the tiny green light indicating their course and which speared the exact center of the screen. He measured the circumference of the dot with a micrometer of sodium light, ran off the difference in the calibrator.

"Latham," he leaned over the rail.

Latham stepped forward of the steering gang, looked up. "Yes, captain."

"Three millionths of a millimeter



in ten million miles is not very much angulation, but in fourteen light-years it amounts to several hundred miles of unnecessary travel. You are off your course," he made it sound like a joke between old friends, "three point two angstrom units."

He stepped over to the lattice, checked the dimensions of the nebulous cloud on the screen. A quick glance at the map above his head showed the cloud had never been charted. Under high magnification he could see the lazy whirling of its vortex. He set drift spots on the larger lumps in the periphery, ran up the time scale to see how near it lay on their course.

"Divert twenty-three angstroms on an axial plane—"

"But don't you want to decelerate and study the cloud for the astrographic office?" Latham asked in bewildered surprise.

Nord smiled indulgently. "It would take us a full month to decelerate, jockey back. Then we'd have to start accelerating again and it would take almost three months to come back to terminal velocity. The time loss would be almost four months. Just chart the cloud and let the office worry about the details."

He looked at the air instruments. He studied them so long he was aware he was being watched by

the men below. He straightened, checked all the instruments before he leaned over the rail to clasp his hands in what appeared to be benign unconcern.

Just as the 0600 gong announced the change in watch he spoke up. "Mr. Latham, give me your air readings."

"Yes, sir." Latham stepped to the air board. "Pressure in the ship, steady at seven-seventy mm; mean temperature twenty degrees, three degrees fluctuation downwards at 2300. Humidity fifty-two per cent. Air motion: forty meters per minute with seven meter variation every fourteen seconds. Composition of arterial air: oxygen eighteen point four three per cent, carbon dioxide point eight three per cent. Excess negative ions to the order of—"

"That's enough." Nord turned back and looked again at his own board. Something was the matter. What had Bickford neglected to do now? His voice took on cold purpose. "Summon Mr. Bickford for me, please."

Corbett turned abruptly, went into his flight quarters. The steward had already made up his bunk and the compartment was now as neat as that distant day on Earth he had moved into it. He drew a cup of coffee from a gleaming cannister, sipped slowly. It would be a good idea to have Hardman check the entire air system from venous intake to arterial outflow. On second thought, he resolved to do it himself.

He was reading the master log when his yeoman entered the office. "Dr. Stacker and Mr. Hardman request permission to speak to the captain."

"Morning, gentlemen," Nord greeted them; he waved to the cannister and cups, shoved a cigarette box across his desk. "Help yourself to morning coffee, then toss me your mind."

Hardman turned to Dr. Stacker, his face drawn and cold. "You tell him, Doc."

The space surgeon lit a cigarette, watched the smoke spiral towards the venous duct. "A lad playing laska ball last night fractured a patella. I had a corpsman up all night watching him because sometimes the bone plastic causes pain. He called me at 2315 that the sick bay temp had dropped four degrees."

"What of that? You have your own thermostatic control," Corbett told him.

"That's true," Stacker admitted, "but I usually maintain ship's temp. When the drop came I didn't know whether it came on order from the senior watch officer or . . . or—"

Nord understood the hesitation. The doctor did not want to be an informer. "You mean," he suggested helpfully, "you wondered if the air officer might be careless."

Stacker nodded. "You saw his act last night at dinner. That is not the action of a normal man. That anger was a paranoid reaction to his hatred for all of us and particularly for you. In you he sees the authority he hates so

much. That scene crystallized in his mind the determination of what he intended to do to the ship."

Nord felt again as if Pluto's frigid winds were blowing out from the center of his being. Dread like a black frozen cloud enveloped his mind. "What did he intend to do?" His voice was voder cold.

"I don't know." The doctor admitted his ignorance in a tight, hushed voice.

Nord was aware of the unperceived worry that flowed over the space surgeon's mind, knew it mirrored his own vague premonition of impending catastrophe. "Go on," he prodded gently.

"I went down to his cabin to investigate. You see I've felt Bickford was a psychopath. No reason you understand," he explained apologetically, "sensed it, an intuitive reaction rather than something of real diagnostic import. He's always been most affable to me, a bit eccentric, but his conduct in the mess except for some vulgar characteristics has been exemplary."

"He seemed O.K. to me," Nord said. "I've made it a point to look for personality change at dinner. He never seemed sour like so many officers do when they get space weary. I never trusted him much," he admitted hesitantly. "I felt that was pure friction between opposing personalities; it seemed to me he was always trying to impress me with his influential relatives."

"They are influential," Dr. Stacker pointed out, "otherwise they could never have gotten him aboard without a psychosomatic examination. When he reported I asked him for permission to contact the Public Health Bureau which maintains medical files on all citizens. He refused. I thought he might have something in his record he was ashamed of and was overly sensitive about it. I asked to examine him myself and he said it wasn't necessary. Well," the physician shrugged his shoulders, "you can't examine a civilian in a military ship against their wishes. After we left lunar quarantine I watched him closely, but as he seemed to adapt to ship's routine I thought I might be wrong. I knew he was money mad, feels wealth will give him the security he lacks. Last night he heard about the wealth on board and because he felt we were not giving him the honor and deference he thought his position warranted he resolved to do something about it and show us how good his mind was.

"He went down to air treatment and got drunk."

"Got drunk!" Nord looked stunned. "Why? How? On what?"

"He used the alcohol showers in air treatment as his bar. Entrance to the chlorophyl banks is through an alcohol bath. The bath is necessary to remove bacteria from the armor, otherwise you would infect the chlorophyl which is about a thousand times more sensitive to infection than a chick embryo.

"I found Bickford clinically intoxicated, he'd passed out in his

cabin. I did a blood alcohol on him and found he had four point three milligrams per cent—that's enough alcohol in the blood to make anyone dead drunk. I'm afraid, captain, in having his party he must have infected the chlorophyl, our oxygen is going down and CO_2 is rising."

"That means recharging the tanks." Hardman slapped the arm of his chair violently.

Infected chlorophyl! The spaceman's one great dread. It wasn't the danger of asphyxiation that worried Nord. They had plenty of fresh media to recharge the tanks. But, until the new stuff grew sufficiently to handle the vitiated air they would have to live from stored oxygen. That meant curtailment of recreational activity and with limited exercise came deterioration of morale. His mind leaped to the crew.

They would be forced to lay in their bunks for hours on end looking at the curving overhead. Corrosion of the spirit from such confinement was the one exciting cause for that most dreaded of all spatial afflictions: Spaceneuroses; the overmastering, unreasoning anxiety syndrome. The claustrophobia that destroyed the very fabric of the mind and that could easily—if long continued—wreck the ship.

And Bickford did it.

Didn't the fool realize his life, too, depended on air? He looked down at the open log on his desk. He closed the book with a snap that strained its metal hinges and wrinkled the sheets of its plastic pages.

He forced his voice to be steady. "Where is Bickford now?"

"He's outside waiting to see you," Hardman answered. "The doctor sobered him up."

Bickford's almost colorless, pale-blue eyes darted a quick apprehensive glance at Dr. Stacker before he turned to stare insolently at the captain. His slack mouth looked as if nature had painted it on his thin, immature face. He jerked his head at the scribespeech on the captain's desk, aimlessly wiped flecks of saliva from his narrow, pointed chin with a pink, silk handkerchief which he quickly thrust into his uniform pocket.

"Mr. Bickford," Nord's voice was ominously calm, "did you check air this morning?"

"Why of course I did," he snapped irritably. He tilted his head, sniffed loudly through his narrow nose. "Seems O.K. to me."

"Did you go to air treatment after the game last night?"

Bickford jerked the handkerchief from his pocket, nervously wiped foamy saliva from his twitching mouth. "I think I did. I turned down the temp five or six degrees, thought the ship too hot."

"A little while later, the medical officer went to your cabin and found that you had been drinking. Do you deny this?" Nord's voice trembled from manifest control.

Bickford forced a weak smile to his lips. He blew a short, explo-

sive whistle of self congratulation. "I was really drunk in my cabin last night. I was just really flooded."

"This is no time for humor, Mr. Bickford. When we planet, I shall charge you with being drunk on duty, carelessness and incompetence and recommend your dismissal from the civilian branch of the Spatial Service."

Bickford shrugged his narrow shoulders. "So what," he answered truculently. His voice became edged with triumph. "My cousin is general manager of Synthetic Air. That's the company who installed the conditioner aboard this ship. He got me assigned to this job over you academy boys. You're jealous of me. I'll tell him what you've done to me and he'll have the Bureau of Personnel really burn you up. You all thought I was dumb. Told me last night I was crazy. I'll show you how smart I was last night." He started to laugh: a harsh, treble, nerve-chilling laugh. "This is a good joke on you, Corbett. When the green goo goes sour, what're you going to do?"

Nord felt an icy vortex swirl around his heart. He leaned forward, damp palms clasping the arms of his chair. He knew already what the man was going to say.

Bickford wiped tears of exultant laughter from his pale eyes. Stared derisively at the officers. "What're you going to do now? We don't have any extra stock or media aboard. We don't have any more of anything to recharge your tanks."

"What!" Hardman leaped to his feet. Nord placed a restraining hand on his executive officer's arm.

Bickford sneered at his startled expression. "I thought that would get you." He looked down at the captain. "While you were checking the ship at Lunar Quarantine, I traded all our reserve stock of chlorophyl powder and nutrient media for a set of bench tools. I made the deal with the captain of Mr. Brockway's yacht. Do you know who Mr. Brockway is? He's one of the richest men on the inner planets. You see, I intended to go into business on Lanvin—"

"You?" Hardman gurgled. "In business?"

"I was going to make beautiful doll furniture. But now I'm going to be one of the richest men on Lanvin," he said triumphantly. "When I learned how much money we had aboard the ship I decided then to show you how brilliant I really was." He looked at them patronizingly. "I'm going to take the money designed for the base."

"How will you do that?" Corbett's voice was so calm it was unreal.

Bickford laughed unpleasantly. "I'm going to make a chlorine generator. It's easy to make, just electrolysis of salt water. I'm going to put that into the air system. While you all are being finished, I'll live in space armor. Then I will land the ship on Dynia,

that's Planet II, and take the shuttle across to Lanvin."

"But now we know all about it, and we're going to lock you up," Nord said slowly. "Didn't you realize we would know almost instantly when the air went bad?"

The realization of what he had said revealed itself in his widened eyes. His head shook from side to side as he started to whimper. "I never thought of that when I spit into the banks last night."

Hardman came forward, cold deadly purpose etched in the lines about his grim mouth and bitter eyes. Nord knew what he was about to do, knew it would have to be done. Hardman was half a meter from Bickford before he spoke. "This is for the crew," he said and his fist came up like a rocket.

Bickford took the blow, rocked under it, caught the second on his mouth and then Corbett and the doctor were between them, shoving them apart.

"The idiot should be chucked in space," Hardman roared.

Stacker was wiping Bickford's crimson mouth. Corbett released Hardman's arm. "He's a sick man," he said heavily. "Go back to your duty. I'll have Dr. Stacker act as air officer. We'll keep Bickford under armed guard in the sick bay for the remaining seven months of the voyage."

"Seven months! Without air!" Hardman's voice became high with the tension of near hysteria. Then noticing Nord's level cold eyes he apologized. "I'm sorry, sir. I must have lost my temper."

"I understand. We'll forget what happened. Now let's see what we can do about the air." He turned to the doctor. "Take care of the patient. I'll meet you down in air control." He looked at the chronometer. It was 0640. It seemed like hours. "I'll be there in fifteen minutes." He finished abruptly.

Corbett glanced down at the glowing tip of his cigarette. This is what came from having a psychopath aboard. Incidents like this were never discussed at the academy. Departments were always handled smoothly by brisk, efficient men always alert to serve the ship. Not even in fiction were there problems like this unwelcome thing. There, the personalities were always good, pure men at war against mythical creatures, invidious planets, self-centered, unpredictable novas or militant civilizations; never at war against their own personal environment because of the stupidity of politicians who insisted that unexamined, potentially insane men be made a part of the ship's company.

Stacker was sitting, feet propped on the air officer's desk studying the "Handbook of Air Management" when Nord walked in. He stood up at once. "I've got Bickford in the brig ward. He's perfectly safe now. Can't harm himself or anyone else." He touched buttons on the desk top and as the drawers slid out pointed at their contents. "Looks like a

rat's nest. He's collected everything in this ship that wasn't welded."

"Never mind Bickford. What can we do about the air?"

"Not very much," Stacker said diagnostically. "You know how this ship handles air?"

"Vaguely. I don't know too much about it. Air management is so vital it's always handled by an officer or civilian specializing in clinical industry." There was no apology for his ignorance. It wasn't his job to know air any more than he was required to know how to practise planetary epidemiology.

"The air system in this ship was designed, installed and maintained by Synthetic Air, Incorporated of Great Kansas. The system uses a modified form of rebreather technic; that is, the unused oxygen is returned to the ship.

"Starting from the venous ducts located in all compartments the air is pulled over a precipitron which removes all dust, oil and water droplets and other curd. It then goes into the separator where the excess oxygen is removed; this passes directly back into the ship's arterial system.

"The remaining atmosphere containing nitrogen and carbon dioxide is then sterilized by passage over plates heated to five hundred degrees, the gases are then cooled and sucked into the ship's lungs.

"These lungs are chlorophyl banks. They are large glassite cylinders filled with synthetic chlorophyl. This is a very delicate substance with no immune property at all and becomes infected readily. Just look at the stuff crosseyed and it starts to decay. Nature protects her chlorophyl by means of the cell membrane but here we use it in its pure protoplasmic state.

"In each tank are actinic generators. As the carbon dioxide trickles up from below photosynthesis converts the carbon dioxide into carbohydrates. Oxygen is a by-product. It's sucked into the negatron, humidified and pushed by blowers through the arterial system."

"Very concise, Doctor," Nord said. "Let's go in and check your new detail."

Air treatment was located on the third deck, just aft the crew's galley in the central section of the ship. The mechanical part of the system was a miracle of chromium and gleaming surgical white. Air sucked through snaking ducts sounded shrilly defiant; the whirring scream of the blowers were the overtones of thin-edged menace. The ducts were shiny with beady sweat and the compartments' cold, dry air was icily chilly.

The air crew stood around with tight, strained faces. Above all the many activities of the ship, they knew how much the thin thread of life depended on their proper performance of duty. When the captain and the doctor walked in, worry lifted from their strong faces and they turned to hide the relief from fear.

"Let's see the banks." Nord shouted above the keening scream of air. He could not help but notice the shining confidence they felt in him.

The chlorophyl banks were normally guarded by locked doors which opened from the alcohol showers. A ten minute alcohol shower on the impervious light weight armor lessened considerably any danger of infecting the chlorophyl banks. Sterile precautions were now unnecessary because the two doors were already partly open.

The space surgeon pointed to a cup by the sump in the deck of the shower. Nord nodded. "Maybe we're lucky he did get drunk or perhaps we wouldn't have caught him before he started putting chlorine into the air system."

Stacker shook his head. "He was too resentful of authority. Long before he would have gotten to that point he would have told you about it in one way or another. He would have had to brag about his mind. The chances are though he would have knocked you out some night, taken the keys to the bleeder valves and released all the air in space."

"Nice guy to have around the house." Nord forced a smile. He gestured towards the inner door. "Shall we go in?"

Normally the four meter vats were glistening green cylinders. Where vitiated air entered from below—because of higher carbon dioxide content—the thick media was a brilliant, leafy green which shaded to a faint glaucous yellow at the top. The compartment should have had the sharp, earthy fragrance of jungle vegetation.

A spasm of despair made Nord wince as he walked into the compartment. The bottom of the cylinders was covered with a thick sediment of sepia-colored muck; ochorous splotches and shafts of putrid yellow matter filled the vats. The surface was a jaundiced froth which bubbled over the top and lay on the metal deck like careless, yolky spotches of sickly yellow paint. The warm, humid air was stifling and the odor of decay was a nauseating stench.

"Whew," Stacker wrinkled his nose in disgust, "Smells like a Venusian privy."

Corbett nodded silently, wiped his sweaty brow. He turned to the air chief who walked into the compartment.

"Did you find any?" Stacker asked eagerly.

"There isn't so much as a can of spare stuff left anywhere," the chief said.

Dr. Stacker turned away and Nord sensed he did not care to discuss a patient's illness with a crew member. "We didn't expect to find any spare media. While Mr. Bickford is ill the space surgeon will be acting air officer." He turned to the physician, waved towards the sick-looking drums. "Can we do anything with this stuff? Resterilize it or something?"

The doctor shook his dead sadly. "Dump it in space," he suggested with a wan smile.

"Not yet," Corbett hesitated to dump anything in space except as a last resort. "It's still converting some air." He led the way into Bickford's former office, prowled

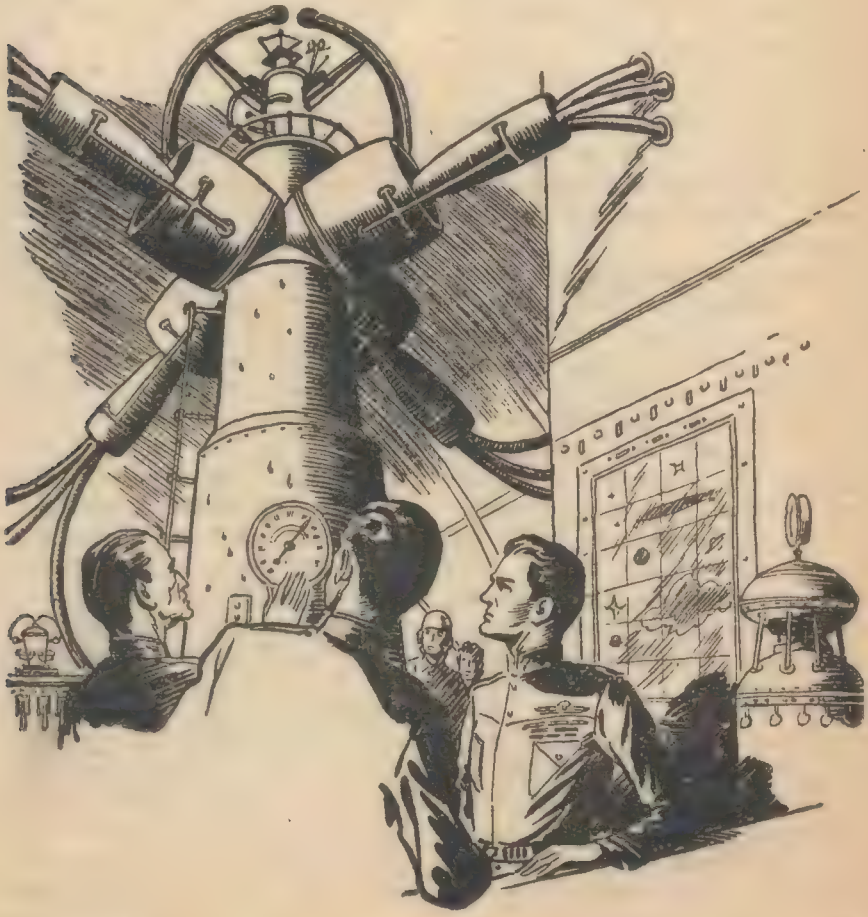
about the office nervously, studied the air instruments, walked slowly back to the desk, leaned on the corner.

"CO_2 content has gone up a tenth of a point in the last hour. Hadn't you better start using the chemical removers?"

"We won't use those until the per cent gets much higher. Not until it reaches two point five or even three."

"I just noticed we have five thousand kilos of oxygen stored in the bulkheads." A shade of bitterness crept into his voice. "At least he left us that."

Dr. Stacker started figuring with stylus and pad. "The average man," he calculated, "uses an average of five kilos of oxygen in twenty-four hours. We have fifty men. That means twenty days of normal oxygen supply."



"Which is what the bureau says will be normal for all ships."

"Why not try and make it back to Earth. We're only one hundred and three days out."

"I've thought of it," Corbett admitted. "I refused to chart a cloud just a few hours ago because it would take so long to reach terminal velocity once we went back to extropic drive. At our present velocity we couldn't divert at better than a hundred angstroms of angular radius. It would take almost two months to complete our turn and then we'd have to start decelerating for Earth. If we slow and turn, we couldn't reach terminal velocity before having to decelerate again. As far as space time is concerned it's as far one way as it is the other."

The doctor shrugged his shoulders. "Might as well keep on then." His level voice was so impersonal Nord could not help but feel admiration for him.

"Do you have any idea how we might augment our air supply? Maybe," he suggested, "changing the rate of air flow, temp or number of charged ions might help us. You know," the captain admitted candidly, "I don't even know why we change the rate of air flow or charge the air. I once did but I've long since forgotten."

Stacker pulled a plastic cigarette case from his pocket, touched the stud, offered the lighted cigarette to the captain. "It'll probably be our last one," he said taking one for himself.

"In a general way," he said answering the question, "it might be said that moist air is depressing and enervating while dry air is tonic and stimulating. Metabolism slows in warm air, speeds up in cool air. It is also known that air motion is a factor of tremendous importance in ventilation in that it contributes to our sense of well beng and comfort. The pat of a current of air upon the skin stimulates the cutaneous sensory fibers, acts directly on metabolism and the vasomotor system.

"Air currents as low as three hundredths meter per second will give a perceptible stimulus to the sensory nerves around the skin and mouth. The variation of air flow and temperature is stimulating and explains the preference of open windows over mechanical systems of air conditioning. This variation is why there is no sensation of stuffiness in modern ships.

"We treat the air here so that it has an ionic content of ten to the sixth per cc of negative ions. Positive ions increase the respiratory rate, B.M.R. and blood pressure. Negative ions produce a feeling of exhilaration and sublime health." He inhaled deeply, let smoke trickle slowly from his nose. "I'd recommend we increase our temperature by five or six degrees, slow down air motion and require all men not actually needed to remain in their bunks. Of course all exercise, smoking, even loud talking will have to be forbidden. I'll change the diet so we'll have a low specific dynamic action, use less oxygen that way. Make the men more groggy,

too. We can string out our oxygen another ten days."

Nord squeezed out his cigarette in Bickford's ash tray. "And after that?"

" 'Good spacemen never die,' " he quoted a line from the song of the space corps softly, " 'they just travel far.' "

"Will it be bad towards the end?"

The doctor looked down at his polished nails. "Very," he whispered, "We'll gasp out our last breath hating the day we were born. It'll not be easy because we'll have so long to know it's coming."

"In fifteen days I'll have the crew write their final letters. I want to write one to my mother and you'll want to write one to your fiancée. You were going to marry when we earthed."

"Isn't there a chance we might cross another ship?"

"There isn't a ship for another three months at least."

"Well we won't be around to see it." Stacker forced a thin laugh. "When the end comes Bickford will really be happy. But he could have done a lot worse things if he'd had more time to think about them. But this will be bad enough."

Nord looked at him steadily. "You'll spare us a bad finale."

"You mean, you actually want me to . . . to . . ." He stopped talking abruptly, looked at the captain with narrowed eyes.

Nord knew the doctor did not wish to make him commit himself. He lifted his head, gaze steady and his voice was like the muffled roll of an organ. "Mercy," he said, "can only be the gift of the strong."

Stacker stood up, held out his hand. "Will you tell me when you've set the dead lights?"

Nord nodded. "I'll turn them on myself and call you." Abruptly shook hands.

"And the condemned, thanks to the psychopath ate a hearty meal."

Nord realized the inevitableness of their situation. He had an evanescent desire to go to the brig ward and wreathe Bickford in a flame pistol but he realized even as he thought it, how stupid an act it would be. It would be like trying to take revenge on nature. The psychopath was nothing more or less than an evolutionary attempt to make men learn to use his brain for the benefit of others and not to live out a life of selfish purpose.

Their situation was a result of Bickford and he was a result of Man's groping attempts to use his mind. How little all that philosophy would help them now. Nord projected his mind ahead, saw himself at the last, coughing against the thin, lifeless air; he saw his crew looking at him with sightless, staring eyes as they slumped wearily down to die on the cold, metal deck.

He saw his ship, hurtling through space, taking a course tangent to Lanvin. The grim dead lights would shine on her bow, telling of their fate. The outer port would be open to make entrance by the investigating party an easy matter.

Some distant day, months from now, they would board the ship, study the log, cremate their remains.

They would cradle the ship, open the holds, remove the freight. New tractors would till Lanvin's fresh, fallow soil and earthly vegetables would grow there.

Their names would be engraved on a bronze plaque in company with thousands of other spacemen who had died, that men might see the stars and beyond. Even though they did die, they had made their little contribution to the cause of man. New things would grow in new places, other than that, man could have no object for his existence. New things to grow in new places.

Lanvin, Planet IV., Sun 3, Sirius System is a terrestriallike planet. It has three large continents and well over a million islands dot its shallow seas. It is a tourist's mecca, a farmer's paradise.

The Space Yard of the Force is located on Centralia, largest of the land masses. The commercial lines land on Desdrexia; they claim the climate is better there. Actually it is just as hot on either of the continents. But Mount Helithon is on Desdrexia. The sight of that seventy-five thousand meter mountain rising from the silky, sanded plain, its pinnacle shimmering like a crimson diamond, made too beautiful a picture for the teleposters. The commercial psychologists couldn't afford to pass it up.

Lanvin has no satellite so the quarantine station was located on Mount Helithon. Dr. Leland Donaldson was Quarantine Officer for the Public Health Service. Because he passed pratique on commercial and government vessels he knew all officials of the big companies and the local brass hats of the service.

He called Admiral Gates, crusty commandant of the yard, invited him to his lofty station for some beer. Not Lanvin's synthetic stuff, but real, old-fashioned beer from Earth.

The admiral looked over his foamy mug at the quarantine officer. His thick jaws crunched on a salt stick. His wrinkled eyes held a glitter like freshly cut steel. He liked Donaldson but sometimes he wondered if he didn't like his beer better.

"Has the *136* left yet?" Donaldson asked after their second stein.

"The *136*," the admiral hesitated. "That's young Corbett's ship. They're Earthing tomorrow."

"Did you go aboard her?"

"Me? Go aboard her?" The admiral looked shocked. "Why should I? I have a staff to do that sort of thing you know. They brought out a lot of stuff for the Colonial Office. Tractors, you know, harrowers, things they use to make things grow in the ground, seeds and well, you know." He waved his stein about the room, slopping some of the beer on Donaldson's tesselated floor.

"Seeds," Donaldson started to laugh.

"Why laugh," Admiral Gates snorted testily. "One of my lieutenants went aboard, came back reporting the ship was spotless, decks like polished glass. Not even so much as a hull scratch. Outer skin

a bit burned but perfectly normal. But perfectly normal you know. He said he left you one patient, chap by the name of Bickley or Bikeford or something. Civilian, politician. You know about that sort of thing. The lieutenant said, Corbett would go places in the Service, had fertile imagination, fertile, you know."

"Fertile," Donaldson chirped. "Then you don't know?"

"Then I don't know what?" Admiral Gates' eyes grew frosty. "Of course I don't know. How should I know? What should I know?"

Donaldson told him. "About a hundred days out from Earth, they were just reaching terminal velocity and their chlorophyl went sour and started to decay."

"No trouble there, ships always carry spare stuff. It's electron fever that gets me. Hate the stuff, you know, high speed, space free electrons going through the skin. It's bad." He shivered and rubbed the wrinkled, red skin of his face. His brows puckered and his lids closed to tiny slits. "Why did their chlorophyl go bad?"

"They had a psychopath aboard. A civilian who was placed in charge at the last minute to manage their air. Had a record of police arrests a mile long, family shipped him out here hoping he would turn over a new leaf or something." Donaldson snorted rudely, "as if a psychopath would. This guy got mad at the ship and all inside it and spit in their chlorophyl. It got infected but quick!"

"But they had spare stuff."

"They didn't though," Donaldson pointed out. "Bickford gave it all away. Traded it all for some tools or something to gain favor with some rich dododo. They were really in a spot."

"A psychopath aboard," the admiral shook his head. "That's bad. They're dangerous. They crawl into positions of responsibility and then when you need 'em they blow up, tear your ship to little meteors. Happens too often. The space surgeons should be more careful. They didn't have any spare chlorophyl you say. Their own lungs were going bad." He took a big swallow of beer. Then he exploded. "Then how in the name of Great Space did they get here?"

"Well," Donaldson spoke slowly, as if tasting every word. "Their stuff was decaying fast. They couldn't recharge their tanks. Asphyxiation was shaking hands with the boys. The space surgeon was set to make things easy at the end with poison in the food or something. Then the skipper's fertile imagination comes through with a roar."

"Don't say 'skipper,'" Admiral Gates interrupted petulantly, "hate the word. Makes me think of sail boats, sea and water, things like that, you know. Go ahead, tell the story," he wagged his finger, "but if Corbett has done something wrong, I want the report in writing and officially and not over beer."

"Well, the captain," Donaldson said in an annoyed tone, "got together with Stacker the ship's space surgeon and they put half their crew to sleep with narcotol, left them that

way for weeks I guess. Cut down oxygen expenditure, you see."

"And," Admiral Gates shouted.

"The rest of them turned gardner."

"What! You said gardner!"

"They turned gardners but big. They pulled their sewage tanks, dried the stuff in the ship's ovens, spread the slew over the recreation deck. They rigged actinic generators over that, shunted their venous air straight through that room and planted seeds in their synthetic ground. They had hydroponic gardens all over the ship."

"Would it grow fast enough to convert carbon dioxide to oxygen?"

"Well it did," the port doctor said succinctly. "They were having fresh, green vegetables from their own garden by the time they planeted at quarantine."

The wrinkles around the admiral's eyes unfolded. "Maybe it's a good thing to have a psychopath aboard, keeps a guy on his toes, you know. Corbett claimed a five-hour delay over Central Sea after leaving quarantine wash. Wanted to empty and clean ship. Makes him a better captain. Yep it's a good thing—"

"It's a good thing he did have a fertile imagination, or else you would be writing letters to his family."

Lieutenant Nord Corbett stood at attention before the blue-iced eyes of the admiral. Through the port behind the commandant he could see his cradled ship. The ground crew had finished the hull polish and in the glare from Lanvin's hot, white sun it glittered like a platinum flame.

"May I have my clearance for Earth, sir?"

The admiral's bushy brows furrowed. "Ready to blow; taking back fifty passengers, you know. Got plenty of water and air?" He rumbled. "Checking them all in?"

"Yes, sir." Nord's face crimsoned under the icy stare of the admiral. "They're all checked. Dr. Stacker, my space surgeon, is giving them psychophysicals now."

"Civilians, too," the commandant frowned, "against regulations, you know."

"Purely caution against infectious disease, sir. The doctor requested it, and I do not argue with the medical officer of the ship. His duty is to prevent illness and—"

"Good idea, you know. Prevents dangerous guys aboard, too."

"I'm ready to drop my ground tackle, float free and blow," Nord said stiffly.

"Glad to hear you youngsters like space so well. No hazard at all now. Was a time it was dangerous. Astrogation was bad, air management poor, crew went crazy being cooped up so long. Purely routine now, purely routine spacing." His eyes took on a knowing glitter. "Did you have a good trip out?" He asked, "Experience any difficulty?"

"No, sir." He said it very stiffly, eyes directly at the admiral. "Usual sort of trip. Little trouble with the air about halfway out, but on the whole a rather boring trip."

THE END.

TIME TO DIE

BY MURRAY LEINSTER

Illustrated by Swenson

***Repentance** for sin was a silly sort of thing, he figured; he was sorry only for his errors that led to detection. And the time-formula that allowed him to go back and fix that up made everything safe—*

Rodney sat on the cot in his cell and stared at a white-hot splash of sunlight shining straight down on the stone floor between the death cells. He was literally dazed. But gradually the news his lawyers had sent him fought itself to the status of a fact. There would be no second reprieve. There would be no commutation. In spite of his standing as having one of the four best brains in the country, in spite of his reputation as possibly the most competent physicist alive, he was going to be executed like a common felon for a commonplace murder. His lawyers could do no more. In exactly three days, prison guards would come and shave his head and slit his trouser legs, and then march him down the corridor to the little green door at its end, and they would take him through it into a room in which there was a squat and ugly and quite horrible chair. They would strap him in that chair and put wetted electrodes to his flesh, and a white-faced man would throw a switch, and Rodney's body, already dead, would struggle convulsively against its doom—

He cracked, suddenly. His flesh crawled as if every separate cell

of his body raised a frightened clamor against its coming dissolution. His bones turned to water. His throat was suddenly dusty-dry. He found his hands clawing aimlessly. He heard himself making noises. They were partly gasps and partly sobs and partly self-stifled screams of terror.

He heard the sounds, and he felt contempt for himself. But he could not stop. His body made shaking, convulsive movements. Great tears poured from his wide-opened eyes, empty of everything but pure animal panic. The noises grew louder. Presently he would be screaming. And, if the doctor did not come in time; if somehow he could conceal his state until no dosage of drugs could ease it, he would be quite mad and then they would not execute him. He would live—

Then there was a noise somewhere close by. It was merely the creaking of springs on the cot in the other death cell, now inhabited by one Limpy Gossett. But Limpy was listening. He was a murderer, too. He had been condemned a second time for his second murder. He was to follow Rodney through the door at the end of the corridor. They had talked often, in the past few weeks, and Rodney felt an illimitable contempt for his fellow criminal. But pride forbade that he let Limpy hear him.

Limpy's voice came, reverberating endlessly against the stone walls and iron bars and iron rafters and roof of the deathhouse.

"It got you, guy?"

Rodney would have welcomed madness, because it would have kept his body alive. But Limpy was a mere professional criminal. His two murders had been incidental to his profession of burglary. His brain hardly rated above a moron's classification. So Rodney clamped his lips shut and fought desperately for composure. After seconds he said, as if drowsily:

"What's that? Limpy, did you say something?"

"Yeah," said the reverberating voice. Limpy was invisible. Rodney had never seen him. But his voice was deep bass, and the echoes in the deathhouse gave it an awesome quality which no amount of bad grammar could quite take away. "I asked did it get you. I heard you makin' noises."

Rodney stirred on his cot. He feigned a yawn.

"I had a nightmare," he said. "A cyclotron sprouted arms and legs and went racing through the lab—"

His own voice echoed, but it would not have the quality of Limpy's. He waited, his hands clenched.

"Too bad," rumbled the unseen Limpy. "You only got three days, guy. Three days an' they march you through the little green door. I got somethin' to tell you when you crack up. It'll help. Let go, fella. What you hangin' on for?"

"Why should I crack up?" demanded Rodney.

"Because," said the booming voice, "you got a chance then. I get one too—maybe. There's a trick y'can work. I can't, but I seen it work once. If I seen it again, maybe I'd get the trick of it."

Rodney, wetting his lips, said skeptically:

"Escape, eh?"

"Yeah," said the invisible voice. "From the deathhouse. I seen a fella named Fellenden do it. Ever hear of him?"

"Not likely," said Rodney. He despised Limpy and all he stood for. He, Rodney, was another order of human being entirely. He— But then he said sharply: "Fellenden? You mean the chap who worked out the indeterminacy field for electron telescopes?"

Silence, as if the unseen Limpy had shrugged. But his bass voice, echoing, said:

"I wouldn't know. He bumped his wife. He was gonna get the hot seat. We was in the deathhouse at Joliet together. He got away. Skipped. Blew. They never knew how he done it. *I* couldn't. But I got a commutation later on, an' after, I got out. Remember him?"

Rodney said suddenly:

"That's right! Fellenden did kill his wife! He left a lot of work undone, and some of it nobody could quite carry on—"

"O. K.," said the rumbling voice. "That's the guy, I guess. We used to talk, same as you an' me. He was workin' on a idea to get away. He told me. 'Helped to talk things out,' he said. It was a trick to get away clean. When you crack up, maybe you can do it, an' maybe you can explain it to me first. Let go, fella!"

The patch of sunlight shone white-hot. For an hour every day it shone into the deathhouse. Its reflection was a soft bright glow which should have been beautiful—but there can be no beauty in twin rows of death cells.

Rodney swallowed. His throat was still dry.

"Why wait?" he asked, with an effect of cynicism. "If it needs desperation, I'm all set now! What've I got to lose beyond a couple of days of waiting?"

His voice sounded all right, but he was shaking all over. He stared through tool-steel bars across the corridor with its spot of sunshine, and into the depths of another cell just like his own, but untenanted.

"Fellenden said," said Limpy, "that a fella hangin' on couldn't work it. A guy's got to use all his brains. If he's defiant, an' clingin' to excuses for what he done, an' insistin' he hadda right to or hangin' on to hope, that's part of his brain that won't work free. A fella's got to be cracked up or else plenty sorry so he don't care what part of his brain gets stirred up."

Rodney said skeptically:

"Ah! No suppressions. No memory blocks. If that means no inhibitions, I qualify! But what's this, Limpy? Self-hypnosis?"

Limpy's voice rolled, and yet was casual.

"He called it time-travelin'."

Rodney stiffened. But that was nonsense! Fellenden hadn't accomplished time travel! He'd devised a field of quite ridiculous simplicity which eliminated the indeterminacy factor that had made electron telescopes impossible. There would be no electron telescopes but for Fellenden. It was true that there was still controversy over how his field worked. Nobody knew what his theory had been. It was known only that the field worked. But time travel—.

"That's crazy," jeered Rodney. "How'd he do it? But it's impossible!"

Again there was a pause as if Limpy shrugged.

"He said we do it all the time. We used to be in yesterday. After a while we'll be in tomorrow. Like bein' on a train that a while back was in a jerkwater town named Tuesday, an'll reach a town named Wednesday presently. That's time travel!"

Rodney laughed shortly, but with a catch in his breath.

"Tell me about his escape," he commanded.

Limpy's voice rolled in every crack and cranny of the deathhouse. After every word there was a whispering echo that lingered with a queerly solemn persistency.

"The night he left," the voice said quietly, "he grinned at the guard when he was makin' last inspection. 'I'm escapin' tonight Clancy' he says. An' the guard says, 'Says you!' An' Fellenden says, 'That's right. Better tell the warden, or you'll catch hell when I turn up missin'.' Clancy did. That guy Fellenden was smart. They knew it. They come an' turned his cell inside out. They stripped him an' hunted over that place like nobody's business. They didn't find anything. Natural! An' Fellenden says, 'I'm glad you did this, Warden. You'll feel better for havin' done it.' The warden says, sour, 'I'll see you in the mornin'!' But Fullenden says, 'Oh, no. I'll be gone. I'd explain if I could, but you wouldn't believe it. Anyhow, you've been warned, an' you'll take all the precautions anybody could, so nobody can blame you. I like that,' says Fellenden. It was funny to hear him talk so quiet an' confident!"

Rodney listened tensely. This was insane, but his body still felt sick and weak with purely physical revulsion against extinction.

"Go on!" said Rodney challengingly.

"The warden says, ironic, 'You takin' Limpy?' an' Fellenden says, 'I would if I could, Warden. I'd help everybody escape if I could—an' so would you, if you could help 'em escape my way. But everybody has to do it for himself.' The warden grunted. He didn't feel easy. Fellenden didn't sound crazy. He wasn't."

Silence, while echoes lingered. Rodney licked his lips.

"In the middle of the night," Limpy went on, "the guard come in an' looked in Fellenden's cell. I was awake. I hadda reason. I heard Fellenden say, "Good-bye,

Clancy. I won't be here when come back' Clancy says, 'I think you will.' Him an' Fellenden laughed together. Me, I sweated. I knew what Fellenden was gonna try. After Clancy went out, he says, 'I'm startin', Limpy. You try an' make it too. Don't talk to me now.' Then it got still. It was so still that I could hear Fellenden breathin'. He breathed quiet an' steady, quiet an' steady— An' then I didn't hear him breathin' any more. Guy, sweat come out on me in gallons! Next time the guard come through he looked in Fellenden's cell. He jumped a foot. He threw his light in there. Then he yelled. Fellenden was gone. Gone complete. They never found hide nor hair of him. They never even found out how he done it. He was just plain gone!"

There were little dust motes dancing in the shaft of sunlight that came down from overhead. It had moved perceptibly. Rodney said:

"How'd he get out?"

"He didn't," said Limpy's voice. "Not out. He got back."

"To where?" jeered Rodney.

"You shouldda asked when," said Limpy. He sounded discouraged. "I shouldn't ha' told you, guy, until you cracked an' were ready to believe. But he went back to the time when he killed his wife. An' then he didn't kill her. He'd found out he was wrong, anyways. So he didn't kill her—an' so he wasn't in the deathhouse for it."

Rodney swallowed. His eyes fell on the note his lawyers had sent him. They'd done everything that the law or their ingenuity could suggest, and they couldn't do any more. There wasn't any more to do. The sight of that message sent gibbering panic to work at his temples again. But Limpy would hear him. He clenched his hands.

"Why didn't you pull the same trick?" he asked sardonically.

"I tried," said Limpy. His voice was flat. "I tried hard. I'm still tryin'. Sometimes I think I'm gonna get it, an' sometimes it seems just crazy. But Fellenden done it. If you could do it, maybe—"

Rodney stood by the bars of his cell. The patch of sunlight was almost near enough for him to reach out his hands and touch it. Presently he would put his hands in it, and feel the warmth of sunshine on his skin. But his hands were shaking.

"It's branching time tracks" said Rodney, scornfully. "That's the idea! There can be more than one past, and more than one present, and more than one future. An old speculation. You do something, and it sets you on one time track rather than another. If you could go back, you could do something else and get on another time track. That's what Fellenden was talking about ."

"Yeah," said Limpy tiredly. His voice rolled like the voice of a preacher Rodney had heard once as a child. But his voice was weary. "Sure! He told me that. You get on a train, he says. It's travelin' through time. Past a town named Monday, an' then past one named

Tuesday, an' Wednesday, an' so on. Every so often you change trains. When you get on the wrong train it's bad. He'd got on the wrong train, Fellenden says, when he killed his wife. He hadda go back an' get on the right one. An' he did. But I ain't been able to. I was hopin' maybe—"

Rodney said with a savage humor:

"There's no reason why not! The theory's there. In a multidimensional universe, anything imaginable not only could happen, but necessarily must! So Fellenden could, in theory, do what you say he did. The trouble would be that he was on the wrong train. His problem was to get off. How'd he do it? I'm on a train I'd like to get off!"

Suddenly his throat was dry for a new reason. He listened with a desperate intentness for Limpy's answer. The shaft of sunlight was close enough, now, for him to reach, but he did not put out his hands. He licked his lips.

"I said the theory's all right, Limpy! How'd Fellenden do it?"

Limpy said heavily:

"That's where I'm mixed up. You' on a train, he says. It's movin' through time. Before you can go back you got to slow up. But the train won't slow. You see a station slidin' by—Wednesday maybe—an' you wanna go back. You got on the wrong train Tuesday. Desperate, you start runnin' for the back of the train. At first you don't see no difference. But you keep runnin'. Presently the station ain't goin' past you quite so fast. Then you run harder. You hold it even, runnin' with all you got. An' all of a sudden you get to the back of the train. The door's open. You jump down to the tracks, an' don't get hurt because you're runnin' back as fast as the train runs ahead. An' then you go high-tailin' it back along the railroad track to where you got on the wrong train. An' the right one's there—"

"It hasn't left?" asked Rodney, cynically.

"No," said Limpy flatly. "I dunno why, but Fellenden said no."

Rodney's pose of cynicism dropped away. Limpy could not possibly have worked out a theory like this. Fellenden must have worked it out, and phrased it carefully in such homely terms for Limpy's untutored understanding. It was pure logic on a familiar foundation of speculation. You did something, and it had evil consequences. You went back in time, before the event which had the evil consequences. You avoided that event. Then, necessarily, you took a branching time track. You went into another of the innumerable futures which at that point in time were possible for you. The evil consequences of the event you avoided could not be in those other time tracks. And you would cease to exist in the first time track at the point where you turned about and went back.

Granted the fact of time travel in this way, which was the only possible way in which time travel could take place, it was sound!

Limpy could not have imagined it. Someone of the caliber of Fellenden must have devised it. And Fellenden had made that indeterminacy field, which nobody else yet surely understood—

Rodney licked his lips. It was the answer, if he could get it—and he had one of the four best brains in the country. But it was enraging that he'd had to be instructed by a common criminal like Limpy!

"I've got it," said Rodney curtly. "I see the idea."

There was a clanking of the outer doors of the death-cell house. A guard came in. He gave the two prisoners their food. Rodney regarded him with the burning eyes of hatred, in silence. The guard went out.

Rodney heard the sounds of Limpy, feeding. Himself, he could not eat. He had three days to live—if he did not solve the problem of time travel as Fellenden had solved it. He could believe in the theory, now. If he did not believe, he would go mad! But besides that, there was evidence that it could be done! Fellenden had done it!

He paced up and down his cell. Time travel. Fellenden had vanished from a death cell in Joliet by traveling back to the time before the killing of his wife. Then he had not killed her. There had been at least two possible futures for him at that point; in one of which he killed her, and in one of which he did not. Rodney lived and moved in the future in which the murder had taken place. In the other—which to Fellenden was now the actual future—Fellenden had not committed a murder, and was doubtless a respected citizen and a prominent physicist instead of an escaped murderer. That other time track was like but not the same as this. It was possible to get into that other time track. Fellenden had done it! Galileo heard that a telescope had been invented, and took thought on the principles of optics, and made a telescope in some ways superior to the original. He, Rodney, now knew that time travel was possible, and he had one of the four best brains—

Time passed. Sweat came out on his forehead. Escape to a parallel time track would be escape of unparalleled completeness. One would have *nothing* to fear. The very cause of one's fear would no longer be real. Not only the penalty, but the event which called for penalty could be wiped out. But there must be a starting point.

He forgot to put his hands into the slender shaft of sunlight. The sunlight died, and he did not notice it. He paced his cell. Three paces this way. Three paces that. A starting point— A starting point—

It grew dark. Rodney was tense and growing desperate. It was possible! The theory of parallel time tracks was almost orthodox! And Fellenden had proved its verity! But how? Given the beginning, Rodney knew he could go on. Given the principle by which experiment could be made, he could envision every detail that experiment should uncover. But he could

not devise a beginning for experiment! He was like someone dying of cold with a fire ready laid but lacking a match, and not knowing how to make a fire drill to produce a spark. It grew maddening!

Night had long fallen when he said sharply into the blackness:

"Limpy!"

He heard Limpy stir.

"Yeah?"

"I've got it," said Rodney, harshly. "But I'm curious about Fellenden. Tell me how he started to work. I want to see if I've got a better way than he had?"

Limpy's voice rolled sonorously among the unseen walls.

"You' lyin', guy. A fella who got that trick would want to tell everybody who'd listen."

Rodney could not imagine it. He snarled:

"Altruism, eh? A part of it is to be kind and good?"

"No!" Limp spat. Rodney heard him. "Just—you can't take baggage. Fellenden said so. He said 'we got all kinda anchors to this time track we're in—we're hitched tight to the train we're on. We got to cut those bonds loose first. We can't hang on to anything in this time track. It's gonna be imaginary presently. We gotta not care about it any more'n something that's imaginary now. Like"—Limpy's voice was unresentful—"like you gotta get rid of feelin' proud you got more brains than me. That ties you to me. I'm in this time track. You wanna leave it. You gotta let go of me. I ain't on the train you wanna get!"

In the darkness, Rodney seethed even as this fitted into the pattern of logic. There was a patch of moonlight on the wall above the opposite cell tier. It was the only light anywhere. Limpy's voice rolled on drearily:

"I guess it's no go, guy. I gave you just about all the stuff Fellenden told me. If you can't make it work—" Then Limpy said dubiously, "There's just one other think he kinda harped on. He says, how do we know we're on this time track anyhow? How'd we know if we got on another one? What's the difference between 'em, to us? How do we know time's passin'? How do we know we're travelin' in time, anyhow? Does that make sense?"

Rodney's throat hurt when he swallowed.

"B-bishop Berkeley!" he said hoarsely. "I see and hear and feel the place I'm in. Therefore it is real to me. What I experience is real, to me. What I do not experience—"

Then he cried out. He found himself clutching the bars of his cell. His voice babbled in triumph:

"That's it! That's how you slow yourself in time! Listen! When you listen to a clock tick, seconds are long! When you notice things between the tickings, they're longer! If you speed up your perceptions by noting ever more trivial things, you slow your rate of travel in time! That's the first step!"

His own voice echoed and re-echoed in the darkness. The little patch of moonlight was very sharp

and very clear. It was inches from the top of the cell door opposite him. He said exultantly:

"Then you break away from current time entirely. Reality is real because it matters. You've got to push away the mattering of everything in the present. A thing which has no sensible effect has no sensible existence. When you shear away every anchor to the present, you're leaving all baggage behind. In effect, you run to the back of the train, empty-handed and unhindered. When you slow down time and cut every tie with the present. you get ready to jump, to leave— And then you'll be able to change your memory of an event a half-second ago to a perception of an event a half-second ago. And when you've done that, you've won! You've started to travel back in time!"

He shook the bars of his cell, crying exultantly into the darkness. This was logic! This was reason! This was infallibly the experimental method he'd needed! His eyes gleamed.

Limpy's voice came quietly:

"An' then what, guy?"

"Then," cried Rodney, in exultation, "when you're no longer anchored to the present by clinging to it, you go back to the last thing you do cling to! You'll have to pick it out before you start! You won't have a chance on the way! You'll think of the moment before you— took the wrong train! You'll stop there! You'll have a chance to take the right train, if you're quick! And then . . . then you'll come back to present parallel time, to this day and hour, but in an alternate existence resulting from the different course you took! Another time track, Limpy! And that's where I'm going to go!"

A long silence. Then Limpy's voice, rumbling soberly in the blackness.

"Yeah . . . I see. Cut loose from now. From everything since the time you wish you'd done different— Yeah! That's it! I didn't realize. I got some cash cached away— All the time I' been tryin' this, I been rememberin' that cache as a stake for me to get started on again. But if I go back to where I gotta go, that stuff won't be on the track my train'll be travelin' on. I got it now—"

Rodney's hands closed tightly on the bars of his cell. He stared at the slowly creeping patch of moonlight. With a fierce satisfaction he listened to his own breathing, noting differences in every breath. He listened, in the monstrous stillness of the death house, to the beating of his own heart.

Limpy's voice came; very grave and very sober.

"I' got to go a long way back. To when I was a kid, I guess. Yeah . . . a long way. All the way!"

Silence. Rodney summoned all the resources of his brain. There were not many brains as good or as disciplined. He knew, and reveled in the knowledge, that all the events that had happened as the consequence of a certain specific instant

would soon be unreal. They would be in another time-track. They would be might-have-beens, to which no bond could fasten him. Knowing of their coming unreality, he could renounce them. They no longer mattered. They were merely imaginings which would presently have no meaning, and therefore had no meaning now. He viewed them with increasing remoteness, listening to his own breathing and his own heartbeat; watching the creeping patch of moonlight on the wall.

Time slowed. There were intervals between his heartbeats. There were pauses between his breaths. He could distinguish different parts of the heartbeat cycle. He could distinguish parts of the parts— The patch of moonlight ceased to move.

It did not move! There were monstrous intervals between his heartbeats. Triumph filled him. The last instant that counted in his scheme of things was enormously vivid. Nothing was important but that. He clung to the thought of it with a fierce intensity, picturing vividly every detail of it.

The moonlight patch receded a little. It moved with a vast deliberation—backward! Its rate of movement—backward—increased with a smooth acceleration.

Suddenly there was confusion which was not confusion, and chaos was not chaos at all. It was night and it was day and it was day again. He moved here and there without volition and without effort, like a weightless object upon an insanely charted course at dizzying speed. He was like a phantom on the screen, movable at incredible rates without resistance. Days and nights went by. He flashed through elaborate evolutions with effortless, infinite speed—backward. His speed increased. He could perceive only in flashes. An instant in a car in the open. The car backed with incredible speed. An instant in the courtroom. He was on trial. Flashes of infinitesimal duration before that and before that and before that—

The confusion and the chaos ended suddenly. He was in the room where Professor Adner Hale lay dead. He, Rodney, had committed the murder in the one fashion no one would possibly associate with him. He had done it with insensate, maniacal violence. It seemed the deed of a brutish and almost mindless fiend. It was inconceivable that one of the best brains in the country should have directed senseless, flailing blows which had continued long after Professor Adner Hale was dead. It was a perfect alibi.

And this was the instant when he had made his mistake. He surveyed the blood-spattered, violence-smashed room. He saw a chair which was not overturned in the simulated struggle. He regarded it with satisfaction.

Before, he had toppled it over, without noticing that under it lay the poker with which Professor Hale had been beaten to death. That had been his mistake. It proved that the chair had not been knocked over in Professor Hale's death struggle. It proved that the

effect of mania was the result of calculation. It set the police to work to discover, not a maniac but a coldly functioning brain which had duplicated in every detail but that one the working of a homicidal maniac's frenzy. That one small flaw had led to the discovery of clue after clue and the condemnation of the country's greatest physicist to death. But—

Now he laid the chair gently on its side. The poker was *not* under it, now. He pulled gently at a chair leg to bring the poker more plainly into view. Now there was nothing but the handiwork of madness.

He laughed softly. One of the four best brains in the country. He'd been overconfident. That was all. Now this small blunder was corrected. He would go into another time track. The discovery Professor Adner Hale had helped with—on the drudgery only, of course—and which he insisted must be published for all the world to know, would not be published now. With it as his secret, in the time track into which he would now move.

He felt his return to attained time begin. Time moved swiftly. It was dawn, and he was somewhere else. It was night, and he was in another place. Dawn and midday and night. His body whirled here and there and everywhere, without resistance. There was confusion which was not confusion and chaos which was not chaotic at all. While his body whirled frenziedly through the sequence of events which lay between the significant moment and the instant from which he had traveled back—but now he moved in another time track entirely—his mind was calmly exultant. He was in the midst of crowds, and in solitude. He was in a room which flickered like a kaleidoscope—which was a courtroom. There was an instant when he was in a car being driven somewhere. He passed through months in flashes of infinitely short duration. Then —

Time steadied. All was normal again. He was in a cell. In a death cell. It was not the cell he had occupied before, but the death-house was the same. It was dawn, and a gray light came in the skylight high overhead. He wore prison garb—but not the same garments he had worn before. The stenciled numbers were different. He was in a different time track, but he was in a death cell.

There were clankings. Footsteps. Three guards and a trusty appeared before his cell. The trusty, twitching, carried a basin of water and safety razor and a pair of shears. He was to shave Rodney's temples and slit his trouser legs for the convenience of those who would presently—today—take him through that green door and strap him in that horrible squat chair, in which after a little his body—already dead—would struggle convulsively against its doom . . .

He was paralyzed. He could not move. The door of his cell opened. They came in. He could not stir. He barely breathed. He was almost in a coma of pure, incredulous horror.

One of the guards handed him a note.

"Professor Fellenden," he said curtly, "you know, the fella who fought so hard for you, got permission to send you this."

Rodney breathed hoarsely. It was almost impossible to move. For an instant he seemed unconscious of the offered message. Then one of the guards stirred, and he snatched it. They would wait while he read it— They would wait that long. No longer—

His eyes were hard to focus. Almost he did not try to read but only to delay, to gain precious seconds of life. But then he saw an equation, and he reacted with a stunned swiftness. And Fellenden had written down for him, in concise equations and precise, scientific phrasing, the theory of time travel with such absolute clarity that a trained brain could grasp it in a single reading. On the very brink of execution, a scientific mind could comprehend and use this, and escape death by the simple process of going back in time and—not committing murder. But nothing else would suffice. He must not commit murder!

Rodney shifted his eyes and stared unseeingly at the opposite wall. So that was it! He'd been wrong, not in a trivial detail of a murder, but in a basic fact. Execution was a consequence of murder, not of a fumbled clue. And Fellenden, who'd been a murderer himself, had to tell him so with pious urgency! Rodney raged coldly. Very well, he'd go back again! Not to a moment just after he'd murdered Hale, but to a time long before! Before Hale had found out anything for which he would need to be murdered.

The guards lifted him to his feet and bound his hands behind him. He was very calm, now. Ragingly calm. With the clarity of conception that Fellenden had made possible, he knew that it would be infinitely easy to escape. Even in the chair itself. With his brains—

He said scornfully:

"Just for curiosity, I'd like to know what set the police on my trail after the murder. Something trivial—but I've forgotten."

A guard said awkwardly:

"You laid down a chair to look like it'd been knocked over. You pulled it where you wanted it by one leg. The cops knew it wasn't knocked over because a loose cushion didn't fall out. An'—your fingerprints were on the leg you pulled it by."

Rodney shrugged. Proof enough. He'd have to go back beyond the murder and not commit it. Too bad! Professor Adner Hale had been a righteous old fool whom it had been a positive pleasure to bludgeon to death. Now he'd have to live in a third time track—

The guards led him out of his cell. He said harshly:

"I'd like to tell Limpy something." When they stared at him, he said impatiently: "Limpy Gossett! In the deathhouse, here! I was given a reprieve so it'd be a double execution."

One of the guards said:

"You didn't get a reprieve, fella. An' there ain't any Limpy Gossett here. Never was. I never heard of 'im."

The green door opened. Rodney was badly shaken, now. Still, he had only to go back in time. But he gave a precious half-second to a raging hatred of Fellenden, who had written piety in with science in his instructions for Rodney's escape. "The important thing," said Fellenden fatuously, "was to be rid of all ties to the time track you wanted to leave. Everything in it had not to matter to you—" Rodney despised him.

There was the squat and horrible chair. Rodney began to listen to his own breathing. To his own heartbeat. Step by step, they marched him to the chair. Slow down time! Slow it! Watch everything! Cut the things that anchor you to this time track! With that and Fellenden's equations it's easy—but Fellenden's a pious fool!

Time did not slow. He realized it in a surge of panic as they strapped him in the chair. Then he knew why. Fellenden held him in this time track! Fellenden mattered! The fact that he had escaped to here! The equations and the explanation he'd given Rodney could not dismiss them as meaningless! He hated Fellenden with a terrible, despairing hatred. But he had to stop hating him and put all his mind on slowing time—

He fought to achieve it with all the strength of one of the four best brains in the country. He was trying when they drew back from the chair and waited, white-faced, for the switch to be thrown.

He sobbed, then. But he was still trying when—

THE END.

IN TIMES TO COME

Next issue's cover is going to be a bit unusual in that it will illustrate no story, but will be a painting of a possible atomic power-steam-electric plant, with an accompanying article on the suggested layout of functions.

Also coming up is a change in size of the magazine. Don't be expecting the old bed-sheet size, however; the change will be practically impercetible. But the change in paper will not be. Most of the change in size will be a marked decrease in the thickness of the magazine—but NOT due to a decrease in pages. We're using a new type of paper, a semi-slick paper instead of the bulked pulp type used heretofore. This will make possible the use of photographs, or photographic-quality illustrations throughout the magazine—and also will make a blacker, sharper type, and a general all-round better impression. The paper is denser and thinner, so the magazine, I warn you beforehand, will look thinner, and feel limper. The pages will be the same.

And present tentative scheduling includes Ray Jones, George Smith, Lewis Padgett, and Eric Frank Russell, only recently back in the writing business since he lost his job. The RAF has been cutting down on personnel, too.

THE EDITOR.

BAD PATCH

BY A. BERTRAM CHANDLER

A soft world of clouds and drizzles and weathered hills doesn't build a hard people. And a soft people—well, they may have quite different, quite potent, means to their ends!

Illustrated by Swenson

For the seventh time George Whitley inserted fresh sheets of paper into his typewriter. For the seventh time he typed the date in the upper left-hand corner. The thumb of his right hand rattled the shift bar. Then, hard by the margin, appeared the numeral one. One space down—and the words "PLEASURE DOME," in capitals, sprang into being in the top middle of the page. Two spaces—and "by" was added. Two more spaces—and "GEORGE WHITLEY."

And that, for a long time, was that.

George Whitley filled his pipe. He lit it. He looked vainly at the many and various pin-up girls on the bulkheads of his cabin for inspiration. He got up from his chair and went to the locker in which he kept his mental lubricants. A glass of pink gin in his hand he returned to his chair.

Ensued an interval devoted to the consumption of gin and relighting of pipes. This was followed

by a brief burst of activity, a sound as of a machine-gun post striving to fight off an attack in overwhelming force. After a brief but spirited resistance the post was overwhelmed and the gunners bayoneted. Whitley read, for the seventh time, the first page of "PLEASURE DOME," tore it from his machine and sent it to join its crumpled predecessors in the wastepaper basket. He lit his pipe again and went out on deck. He looked disapprovingly at the small men-o'-war berthed all around his own ship, looked almost longingly towards the glare of lights in the eastern sky that was Honolulu. He wished that it was not his night aboard, that he was with his fellow officers sampling the dubious delights of that vastly overrated city. The quiet evening of literary endeavor to which he had looked forward had all the earmarks of a failure.

Yet there was a certain stubbornness, a knowledge that he could never hope to be a writer if he were incapable of overcoming such bad patches. Somebody had told him once that if a story refused to get off to a flying start, refused to write itself, the best policy was the abandonment of that story until such time as it, of its own accord, clamored for expression. Somebody else had told him that if you took a bunch of oddly assorted characters and dumped them down in some strange environment a story was bound to grow from the potentialities of such a beginning.

It was possible, thought Whitley, relighting his pipe. It was worth trying. There was nothing to lose —with the exception of a sheet or two of paper. Time was of no consequence. He had nothing better to do. He conveniently forgot the arrears of correspondence that somehow never got made up, took fresh paper from the box on his settee, placed the carbon between the two sheets and began.

Night and day the mists sweep slowly over the surface of Loalon. There is neither sunrise nor sunset, and dawn is but a creeping pallor in the eternal overcast, and dusk is a gradual, almost imperceptible diminution of the dim, watery light.

Were Loalon a world of craggy peaks, of tortured rock masses upthrust into the gray vagueness of the sky, the harsh outlines would be softened, the sharp edges and contours would be blunted in appearance if not in actuality by the quivering, saturated air. But there is nothing hard on Loalon. Low, rounded hills rise gently from long beaches that slope down reluctantly to meet the long, low swells of the gray, tideless sea. And the gentle curves of hills and valleys are rendered even more formless, more diffuse, by the feathery gray-green fronds of the luxuriant vegetation that springs from every square inch of solidity, that struggles invisibly, silently, but with a grim ruthlessness for foothold, for life itself.

There *was* nothing hard on Loalon.

And then the ships of Man

dropped down through the mists, the machines of Man blasted and leveled, and around the beachhead of the invader rose the stark, utilitarian outlines of warehouses, administration buildings, living quarters and places of recreation.

And even the soft, humid air could not soften the alien contours. The fecund plant life would have done so—but it was never allowed to spread over roads, over roofing and walls. Within the confines of the settlement it was bullied and regimented into neat, geometrical plots, was forced into hateful proximity to plant life from other worlds. And the works of the aliens stood proud and aloof, not belonging, hard amidst the all pervading softness.

And to Loalon came Captain Dallon.

A big, hard man was this Dallon—and he was master of a big, hard ship. Not that *Draco* was unpopular among the men who ranged the space lanes. Dallon was hard—but just. And his ship was run with a smartness, an efficiency, that could not have been surpassed—or even equaled—in the Space Navy. And his officers took pride in the reputation of their captain, of their ship, and gave that little extra effort that means so much, that lesser men could have obtained by neither bullying nor cajolery.

And so *Draco* dropped down through the mists to Port Munroe, and on the night of her arrival day Captain Dallon, as was customary, dined at the mayor's palace.

"You are hard, you Earthmen," said Lloral. "You are hard. I wonder if you are also brittle?"

Dallon smiled—a hard smile. In his mess uniform—angular, glittering—he looked so much harder than in his customary undress rig. He took a walnut from the bowl on the table and, disdaining the silver crackers, crushed it between his strong, capable hands. The tiny, sharp splintering sound was distinctly audible.

What could have passed for a smile glimmered on the vague, smudgy features of the Loalonian trade commissioner. He, too, reached out to the crystal bowl. The long, soft fingers selected a nut with slow deliberation. And how it was done none of the others at the table ever knew. There was no display of force, no sharp, fast muscular effort. But somehow the two halves of the nut, neatly separated, lay mutely on the soft, moist palm.

These people are the worst I've seen, thought Dallon. *It wouldn't be so bad if they weren't humanoid. But their likeness to us makes them all the more unlike—*

He looked across the table at the native, at the soft, flabby body, the effeminate, pale lilac robes of soft, gauzy silk. There was dislike that he could not disguise in his hard, gray eyes. And there was dislike bordering upon hate in the blurred yellow eyes that stared back into his. It was not hate in the sense that it was personal hate for Dallon—but it was hate for all that the man stood for. It was hate for the

hard men from the stars, for their hard minds, for the hard exactitudes of their sciences that were made concrete in the hard, harsh outlines of their buildings and machines.

And tension built up inside the room, so that the mayor at the head of his table stirred uneasily, so that the fort commandant felt himself wondering how good his defenses would be if the natives should ever decide to drive the hated strangers from their world, so that the womenfolk, as womenfolk ever do, let their minds dwell uneasily on what would be their fate should the attack come and the defenses and the garrison be found wanting.

"You are hard," said Lloral. He settled back more comfortably in his chair. The pale lilac robes fell into folds that were too soft to be graceful. And still the yellow eyes, glowing balefully, stared into Dallon's face.

The spaceman shifted a little uneasily. The miniature decorations on the left breast of his jacket tinkled ever so faintly—but the elfin tintinabulation was sharply clear. It broke the spell, the soft, gray formlessness that was creeping in from outside the palace, the feeling that the marching mists had breached the defenses, were sweeping down to smother forever this alien rigidity from beyond the stars.

"Yes, we are hard," said Dallon.

And being the man he was he could not hymn the very hardness upon which Man had built his Empire. He could never have sung the harsh scintillance of the stars as seen from the control room of a ship in space, the gleam of light on burnished metal, the austere beauty of straight lines reaching to the sky in Man's great cities. All this was in his mind—and in such matters he was inarticulate. But he found himself thinking how erroneous is the idea that Nature is hard. Nature abhors the straight line. And Nature may work, on occasions, with the harsh, spectacular violence of the earthquake, the hurricane, the levin bolt—but in the main her destructive agents are the tireless, creeping tendrils of her plants, the insidious rootlets that, given time, will bring the proudest construction down to a soft outlined mound of ruin.

Lloral sighed.

It was a soft ghost of a sound. It expressed much—and little. It seemed to be the voice of his world protesting faintly and ineffectually against its violation by these coarse, trampling invaders. It held a querulous note of despair at the trade commissioner's inability ever to understand the alien philosophy of these Outsiders. There could have been contempt in it—and there could have been envy.

And led by the lady mayoress the womenfolk left the table, left the men to one last glass of wine. And it was not long thereafter before Dallon found himself, along with the other guests, watching the latest New York musical, the recording of which had occupied a very small corner of the capacious hold of *Draco*.

Dallon refused the offer of a car back to his ship.

The walk from the mayor's palace to the spaceport was not a long one—and even if it had been he would have welcomed the opportunity to stretch his legs. He settled his cloak about his shoulders. The night was not cold, but its dampness brought a chill feel to the air. Through the mists the lamps along the straight, long road to the port shone with a diffused glare, each with its iridescent halo. And their radiance was reflected from the wet surface of the road so that it looked like a river with lights along its banks. No, not a river—it was too straight. Like a canal it was, a canal stretching from the small busy port which was the brightly lighted hallway of the palace in which the guests were saying their farewells, from which the guests were making their departure. A canal stretching away into the wet mists, away from the warm, friendly world of men.

Dallon shivered.

He was not an imaginative man, but he began to be sorry that he had refused the offer of the fort commandant to run him back to his ship. He considered going back inside to order a taxi. While he stood hesitant a figure detached itself from the group just inside the lighted doorway. It was Lloral. He came silently, with deceptive swiftness, to stand by the captain's side.

"Captain Dallon, you are walking back to your ship?"

"Yes."

"Would you mind if I accompanied you? The night air is good after being inside. You people love harsh, bright lights, hot, dry air. It is good to breath the air of Loalon as it should be, to feel the soft caress of the mists, to smell the scent of our growing things."

"I shall be pleased to have your company," lied Dallon.

He would not admit it even to himself—but he was frightened. And he knew that it was an absurd fear. A big, strong man like himself had nothing to fear from the soft, flabby native. It would take at least six like Lloral to best him in a hand to hand encounter—and unless the guard had been criminally lax Lloral was the only one of his race inside the settlement walls. Besides— With a surreptitious movement Dallon made sure that his small caliber blaster was still in the shoulder holster barely concealed by the short mess jacket.

Together—the tall, broad Earthman, the short, flabbily fat Loalonian—they began walking down the long, straight road to the spaceport. The mist brushed their faces like lightly clinging fingers. At times they could see almost the full length of the road, could see the glare of the floodlights by which *Draco* was discharging her cargo. At times they were in a little world of a few feet of wet road surface, of one lamp standard with the bright globe of its light set in another, vaguer globe of misty iridescence.

"It is a good world," said Lloral slowly and softly. Then— "It *was* a good world."

"Until we came, you mean?"

"You are blunt, captain. But that is what I do mean."

"You hate us, don't you?"

Lloral said nothing, averted his face so that Dallon could not read the answer on his features.

"Yes, you hate us," continued the captain. "And I'm not sure that I blame you. But—it could be worse. Have you ever heard of the Grakkians?"

"No."

"We don't know where their home world is. It may not even be in this galaxy. But their progress has roughly paralleled ours, kept pace with ours. They have the interstellar drive. And if *they* had come to this world there would not have been a mere spaceport and trading station. If *they* had come first your skies would be reflecting the glare from their factories and foundries—and your people would be slaving in those same factories. Every inch of your ground would have been under intensive cultivation—and your people would have been the laborers. When there's a man with a whip standing over you, you either work or fight. And—"

"And we're the kind that would work. You needn't say it captain. I could read your meaning quite easily."

You soft, bitter devil! thought Dallon.

The two walked on in silence. The captain was glad when the mists suddenly lifted, when he saw before him the shining hull of his ship, gleaming in the glare of the floodlights, standing tall and proud like a tower built by some inspired architect. Flimsy, a web spun by a mechanical spider, the conveyor belts ran down from her cargo ports and down them came a stream of bales and cases. The glaring lights, the cheerful bustle, were a welcome antidote to the soft misery of the night.

Dallon paused at the foot of *Draco's* gangway. He looked down with real but unconscious arrogance at the trade commissioner. He wanted to thank the other for his company and bid him goodnight—but as a shipmaster he was Earth's ambassador. A very real—although unpaid—part of his duties was the extension of courtesies to beings such as this Lloral. When he asked the other to come aboard with him, he hoped that the invitation would be refused—but it was not.

Aboard *Draco* Dallon felt better. This was his ship. This was his world—and he was king. The smartly uniformed cadet at the gangway head saluted both the captain and his guest—and Dallon noted with approval that there was a barely perceptible touch of condescension in the compliment paid to the visitor. He should not have approved—and he made a mental note to the effect that the cadet would be on the carpet in the morning. But he did approve.

Lloral looked around at the plain, yet comfortable, furnishings of the captain's flat with interest. And there was that in his manner which dispelled Dallon's ease of mind, dissipated his sense of well-being. It

was a condescension far more subtle than that shown by the cadet on duty, it was the impression that here was the representative of an ancient civilization visiting the mud hut of some savage chieftain. Dallon scratched the prospective lecture on etiquette out of his mental notebook.

Nevertheless—as host he had duties.

"Try this Salerian wine," he said. "It is far superior to the brand they keep for export."

"Thank you."

Over the glasses the eyes, hard gray and soft, smoldering yellow, met and struggled. It was not a clash. Rather it was the hampering, the enveloping of a keen steel blade by fold upon smothering fold of soft, amorphous fabric.

The wine was sweet and potent, heavy, a fit potable for a harsh, dry climate, the cold, arid world from which it had come. But in the soft, humid warmth of Loalon it was too heavy. Dallon struggled to keep his eyes open. The vague smear of features that was Lloral's face became even more vague, doubled and then, as the captain blinked, coalesced again. He wished that the native would finish his drink and go. But Lloral reached out for the heavy, fantastically ornamented bottle and refilled both glasses. And Dallon was almost jerked fully awake by his keen resentment. He had become used to the different usages of different worlds, different cultures—but on every world but this hosts and guests kept their places.

To take his mind from the affront—conscious or unconscious he had no means of knowing—he started to talk.

"This is my first time in Loalon," he said slowly. "What are your exports?"

"Toys, captain. Just toys. But they pay."

"Such as?"

Lloral fumbled in the folds of his tunic. His hand came out of the pale lilac silk with a ball. Just a glass ball it was, perhaps four inches in diameter. There was nothing about it in any way outstanding, no luster or play of color. Lloral pulled the center of the dark-blue table cover up so that it made a little mound, and on this he set the little crystal sphere. The whole scene was somehow vaguely familiar. Dallon thought back, remembered how, years ago, he had visited a so-called Psychic Consultant. The quack had used just such a ball as this.

"Who buys these things?" he demanded.

"There is a certain class on your world, captain. They call themselves mediums, clairvoyants. And this is one of the tools of their trade."

"But they are swindlers, fakers."

"Not all. There is power in these little balls. Not the crude power of your machines—but still a very real power. A mind of the right type with one of these as its instrument can reach into the past, can range all over the present, can even see a limited way into the more probable future."

Dallon laughed—a short, harsh sound.

"Trickery!" he asserted flatly. "Trickery. Fit only to deceive silly, neurotic women and drunken spacemen!"

"Perhaps there are tricksters. But look into the ball."

It was then that Dallon felt the insane desire to ring for the watch, to order the native thrown off his ship. His strong, square hand hovered over the bell push. But there came a flood of realization into his mind, the knowledge that such an action, even if it had no more serious consequences, would make him the laughingstock of the spaceways. It might well ruin his professional career.

"Look into the ball."

Lloral's voice was soft, insistent. It was the slow dripping of water that would, in time, wear away the hardest stone. It was the marching mists of Loalon that had, in the course of ages, weathered that planet until it was a world of low hills and shallow valleys. It was the insidious softness that will shatter granite.

"Look into the ball."

Again Dallon laughed.

In his uniform with its gold and brass, its bright, tinkling decorations, he was the barbarian conqueror confronted with the representative of some elder, decadent civilization. If there were aught of uneasiness in the sound only a supersensitive ear could ever have detected it.

He looked into the ball.

And George Whitley, that poor pulpster who had so often to force his reluctant fingers to pound the keys of his typewriter, was now striving with all his strength to stop from writing. Once started, the story had written itself. From one sentence to the next Whitley had not known what was going to happen. But this he *did* know.

Dallon must not look into that crystal.

But—

Slowly, reluctantly, each fall of the type a sound sharp, distinct, abnormally heavy, the sentence spelled itself out.

He looked into the ball—

The typewriter fell silent. The only sound was the whine of the fan motors on the deck above, the rush of air through the outlet of the thermo-tank system. From outside, briefly, for not long enough to break the spell, came the sound of the striking of ships' bells, a certain blaring of bugles.

"Where am I?" It was a voice in Whitley's mind. It was a voice that could not possibly have any inflection—and yet it did. The inflection of blind panic.

"Where am I? You are not Dallon. This is not Loalon."

Whitley found himself walling as much as possible of his thoughts, his memories, off from this invader. He did not know how he did it. But he did it. And the alien entity inside his head scurried around like a rat in a trap. It was a rat in a trap. And Whitley found it impossible to control the movements of his own body. Every muscle

began to twitch—slightly at first and then building up in intensity until Whitley fell from his chair and writhed helplessly on the deck of his cabin.

He was frightened. He remembered reading somewhere how violent convulsions have been known to break bones. And, even more frightening, was the thought that unless he could get things somehow under control it was not impossible that he would end his days in a padded cell.

Be quiet! he thought with grim intensity. Then: *You are Lloral?*

Yes, yes. But how did you know? And who are you? Who are you?

Be quiet. Don't panic.

Slowly, carefully, Whitley got up from the deck. The convulsion of his muscular system had eased in intensity until it was no more than a rapid quivering. He went to his locker, poured himself a stiff gin. He felt better when it was down. He poured another one.

I don't like this stuff. Have you no Salerian wine?

Whitley laughed.

You'll take gin and like it. Now—let's have your story.

There was a sense of strain, of the pushing against invisible, intangible barriers. Then—

It is not possible. You have built a wall. There must be—

Whitley supplied the word.

—osmosis—he thought.

Yes, yes. And interchange.

Whitley poured himself a third glass of gin. But when he tried to raise it to his mouth his brain refused to obey his orders. *His* orders.

No, came the thought. *I do not like it.*

Then get off my taste buds and let me like it.

No.

Look, thought Whitley, slowly and distinctly. *Let me have it and I'll let the barrier down.*

Agreed. But you are doing our body no good with that filthy stuff.

Our *body?*

Whitley spluttered his indignation. But he found that his right arm was once more under his control. And unless he kept to the bargain he would know nothing more than the vague suspicions that had begun to flood his mind. And he had to *know* before he could hope to do anything about it.

It was a simple story.

Lloral had hated the hard men from the stars. He had despised them. And he had envied them. And to his mind the most lordly of the invaders were those who had, as extensions of their own bodies, the huge hulls of gleaming metal that dropped down through the misty skies of Loalon, that bridged the gulf between the stars.

Lloral could never hope to command such a ship. His race were never shipbuilders. Their strange minds were not made that way. The machine, to them, was a hateful mystery. But they envied the power that mastery of the machine brings.

And that is all that it was—at the beginning. Just a desire, hardly

malicious, to sample for a few moments the feeling of kinship that must be part of the life, the whole life, of such a man as Dallon. And when Lloral found himself not in Port Munroe but in Pearl Harbor, light-years not centuries away, that part of him that had made the trip felt itself trapped, fell victim to a mad panic that bade fair to send both its own reason and that of its host tottering down into the dark chasm called insanity.

But how? demanded the thought that was Lloral. *How?*

I don't know. But I can guess. Dallon, as one of my descendants, is on my world line. World line? How can I put it? The fourth-dimensional extension of my three-dimensional body. My mind has the ability to look along the time dimension. At least, I suppose it has. Dallon's mind was just the conductor between your mind and mine.

But—can you get back?"

Briefly the communication between the two entities broke down. It was not an act of conscious volition on the writer's part. He could not tell if it were so on the part of Lloral. And for a second or so he hoped that his unwelcome guest had returned to the distant age, the distant world, from which he had unwittingly been invited.

But it was not to be so.

Lloral was back—and the very texture of his thoughts exuded a smug satisfaction.

I have seen your world, came the message. *It is crude, and coarse, and noisy. But in it I . . . we . . . could gain great power.*

Pictures flickered across Whitley's mind. He saw a sign in neon tubing, GEORGE LLORAL, PSYCHIC CONSULTANT. He saw the long stream of those who would pass through the door under the sign. First, silly, neurotic women of the working and middle classes. Then—even sillier and more neurotic—the womenfolk of the well-to-do. And there would be men as well, and there would be secrets of business and politics, and there would be the secrets that are in every private life—and there would be blackmail.

There would be power.

And it would all come from the little crystal ball that Lloral, using everyday chemicals, would make with George Whitley's hands. It would come from the alien entity in Whitley's mind, the entity that would, in a long time or a short time, oust the intangible bundle of memories and habits and conditioned reflexes that was George Whitley.

"No!" cried the writer aloud. "No!"

But you must. Look.

Again Whitley saw pictures. He saw himself on the bridge of a ship, at night. He saw, to starboard, a long coastline with its flashing lights. And he saw himself go to the open door of the wheelhouse and give an order to the helmsman, and he saw the order unquestioningly obeyed. Short minutes later came the grounding.

But you can't. You couldn't make me give the wrong order.

There was a pause. Then—

Perhaps not. But—I can stop you from giving the right one. Look.

Again came the pictures. This time it was collision at sea, in heavy rain with poor visibility, with disaster to be averted only by each ship doing exactly the right thing with no time lag. One ship acted and acted fast. But it wasn't enough. The other ship did nothing, held her course and speed. It was Whitley's ship. And in the silence of his room he could hear the screaming of rent plates, the hissing roar of escaping steam, the cries of those trapped below decks.

You see? I can ruin you.

Somebody was stumbling up the stairs leading to the officers' section. Somebody who came along the short alleyway to Whitley's door, who noisily pulled the curtain to one side and peered into the room.

It was the Fourth Officer. His hair was untidy, his face was flushed and the knot of his tie was under his left ear.

"Jusht back, Mr. Whitley," he said thickly. "Jusht back."

There was no help here. Still—

"Look, four-oh," said the writer quickly, "I've been hammering away at my old typewriter all night, and I feel like having a breath of air. Do you mind holding the fort?"

"No, no. S'a pleasure."

The Fourth staggered away from the open door. Whitley heard him collapse heavily upon the settee in his own room.

The writer went to his wardrobe and took out a pair of gray flannel trousers and a light sports jacket. He took off his white uniform shorts and pulled on the gray flannels. He replaced his white shoes with a pair of brown ones. He buttoned up the collar of his shirt, hastily knotted a gaily colored tie about his neck. And when he put on his jacket his epaulettes were hidden from view.

What are we . . . you . . . doing?

Going ashore.

Why? Then— *Oh, I see. You hope that if you show me how harsh and noisy this world is I shall go back to my own place and time.*

Yes.

It won't work. Your mind has shown me pictures of all of this world that you know. And I can endure it.

Whitley chose his seat carefully in the bus from Pearl Harbor to Honolulu. He sat right over the rear axle. It was not comfortable—and he hoped that Lloral would find the continual vibration even more uncomfortable than he did. But it did not work.

And then, in the city itself, the alien developed the urge to experiment with the many and various potables offered for sale. He finally settled on rum and coke. He liked it. This was not too great a hardship—but Whitley was paying and it seemed to be getting him nowhere fast at forty cents a time.

He tried the juke boxes, tried get-

ting his nickel's worth of the noisiest, most unmelodious melodies of those in stock, hoping that the harsh cacophony would convince Lloral that Earth was far too noisy and crude a place for one from the soft culture of Loalon. This might have worked—but Whitley found himself inhibited from monopolizing the gaudily lit machine—and with others feeding in the small silver the result was just as likely to be Hawaiian guitars as hot swing.

And then the bars started to close and the police began to look balefully at anybody in the streets who as much as staggered and Whitley thought it as well to return to the ship before capping the night's misadventures by getting locked up. This would have been a small misfortune compared with that which had already befallen him—but it bulked illogically big in his befuddled mind. Luckily Lloral was of the same way of thinking and between them they persuaded Whitley's body to steer a dead straight course to the bus stop, to stand patiently in line with the rest of the crowd awaiting transport to the Base, and to produce and show the officer's identification to the marine guard at the main gate.

Sorry I haven't any Salerian wine to offer you, thought Whitley sardonically as he ascended the gangway with dignity. *You'll have to be content with gin.*

You will purchase a large stock of this rum and coke, came the unhumorous reply.

Oh yeah?

Yes.

Whitley climbed the stairs to the officers' rooms. From the Fourth's room came loud snores. Nobody else was back. He slumped down into his chair before his open, untidy desk. For a few minutes he did nothing. The words—GEORGE LLORAL, PSYCHIC CONSULTANT—in neon lights kept forming and reforming before his eyes. Imaginary though they were they were the only thing in focus. He debated with himself whether to go through to the bathroom and be sick.

He felt in his pocket for his pack of cigarettes. He took one and, at the third attempt, put its end into his mouth. He fumbled for his lighter. He span the wheel with his thumb; there was a spark but no flame. He used a dime for a screwdriver and uncovered the filling hole of the lighter. He took the bottle of lighter fluid from the top of his desk and untidily slopped the fuel into the lighter. He reassembled it, lit his cigarette.

It occurred to him, then, that it was foolish to smoke when sitting only a few inches from an open bottle of lighter fluid. He reached out clumsily for the bottle, pulled it to the edge of the desk top. It overbalanced, fell into the mess of papers beneath. And when Whitley grabbed in a vain attempt to catch it he knocked the cigarette from his mouth. There was a soft, yet fierce, explosion and the desk top was a mass of smoky flames.

And Whitley, faced with this emergency, was sober in an instant. He leaped from his chair, ran into

the alleyway, returned with the portable extinguisher from its rack. And before the fire had time to consume more than the original gasoline it was smothered beneath the mass of carbon dioxide bubbles that jetted from the nozzle of the extinguisher.

Whitley sat down heavily. The shock had left him weak and trembling. And he felt somehow empty.

Well, he demanded at last, *do you still like this world?*

There was no answer.

Speak up, he thought irritably. *Why didn't you make me do the wrong thing just now? Or was it the wrong thing?* Then— *But it was the right thing for Lloral. But it wasn't in time!*

With feverish hands he fished and fumbled among the mass of scorched, sodden papers in his desk. And he found what he was looking for, the last page that he had written of his unfinished story. His eyes skimmed the blurred typescript:

. . . weathered that planet until it was a world of low hills and shallow valleys. It was the insidious softness that will shatter granite.

"Look into the ball."

Again Dallon laughed.

In his uniform with its gold and brass, its bright, tinkling decorations, he was the barbarian conqueror confronted with the representative of some elder, decadent civilization. If there were aught of uneasiness in the sound only a supersensitive ear cou . . .

And that was all.

Whitley stood with the sheets of manuscript in his hand. The acrid smell of burning was strong in his nostrils. He looked down to his metal-lined wastepaper basket, the container which had seen many a small bonfire of confidential papers, superseded by later instructions and labeled TO BE DESTROYED BY FIRE, during the war years.

But he was a badly frightened man. If he destroyed the rest of his manuscript by fire—*what would he be destroying?*

He stiffened with resolution. He picked up his typewriter, set it down on the filthy desk. He removed the cover. He inserted a sheet of paper. After a moment or so of hesitation he removed it. He inserted two sheets with a carbon between.

If there were aught of uneasiness in the sound, only a supersensitive ear could ever have detected it.

He loo—

The carriage was pulled back to the beginning of the paragraph. Half a dozen "x's" deleted the offending word and fragment of word.

He loo—

Damn!!

He l-o-o . . . . . m-e-d huge over the little native as he rose unsteadily to his feet. A little off balance, he clutched at the table edge for support. The cover, caught in his big hand, slid from the polished top. The crystal ball rolled and, before Lloral could catch it, fell to the deck where it splintered into a million glittering shards.

"I'm sorry," said Dallon, with a sense of inadequacy.

Lloral rose to his feet to go.

"It is nothing," he replied. "It was only a toy."

THE END.

(*Continued from page 98*)

"You think a lot of me," she said. "Would you talk to save me from torture?"

A bead of sweat popped out on Jack's forehead as he thought it over. "That's a double curse," he said grimly. "You'd prefer torture to misloyalty and I'd be torn between the two because it is against all natural instincts for a male to harm a female. That's a forty-thousand-year heritage, Jenna."

"Well," she said, "I'm in that position but I'm without the means to say the word and relieve his torture."

"And he," said Grant, with feeling, "is pretty much in the same boat."

"Before this all happened there was enough to outweigh any doubt. But I'm practically accused of treachery."

Grant smiled tolerantly. "Most of that is in your own mind," he said gently. "You've kept your fears bottled up too long, and they're fermenting into all sorts of questionings and worries."

"Then I'm not really under suspicion?"

Grant laughed. "My dear, if they're reading your mind without your will, that's not treachery. Frankly, I've studied the problem myself, and I know that such is impossible. In no known science has there ever been a situation where a transmitter can be heard without the transmitter aware of its output. By 'transmitter' I mean people talking, men holding radioactives, radio, subradio, light, sound, and fury. Furthermore, since unwitting aid is ruled out, if such aid is given, it is given willingly. And that, Jenna, I refuse to believe."

"Truly?" she pleaded.

"I'll stake my life on it," he said. "All the evidence may be damning but somehow, it's too pat. Coincidence may be a little strained, but far from improbable in any sense. Fact of the matter is, Jenna, there's no sense in going out on the Q-T. I'm going out with all recorders open and working furiously. I'm going to record not only my ideas, but my transient thoughts and my overt acts. I'll show 'em a bold front. And, by showing a bold front, I'll win. And if I do not, you'll all know just what goes on and you'll know how to act on the next one."

Grant laughed and shook the girl gently. He removed a handkerchief from his breast pocket and dabbed her wet eyes with it, and told her to get that elfin chin up again.

"Thanks," she whispered, the tears welling up again. "Thanks, Jack . . . for . . . faith!"

When the door opened to admit Lindsay, her face was once more composed. She put down her cigarette and said: "Any ideas, Ralph?"

His worried face grew darker. "It seems to get down to the problem of defusing a bomb that explodes when you approach it with that intent."

Grant laughed. "As I said before,

we can detonate 'em but it's hard on the personnel."

"Oh, Jack!" cried Jenna.

"Well," he grinned, "it's true. And regardless of whether we lose a few fellows who'd prefer death anyway, we are most definitely keeping the production areas uncontaminated. That's something."

Lindsay scowled. "It's not good enough," he said. "A man's life should be worth more than that."

Grant shook his head. "It's more than mere production, Ralph. Production means many lives. And is one man's life worth more than many men's?"

"To me, my life is."

Grant laughed, taking the sting out of his matter-of-fact statement, "You're selfish."

Lindsay nodded glumly. "I admit it. "How're you going to tackle that one out there?"

"Boldly, brashly, and brazenly. Whatever agency is manipulating these things will find me slightly different. I hope I'm confusing enough to make them wonder."

"I wish—" said Lindsay.

"Forget it," said Jack. "I've got to go, and there's little sense in stewing about it. I'll be back, and then we can handle the rest of these things with ease. No chin up, fella. You're in the hot spot of doing a hard job."

"I know," he muttered.

When he looked up, Grant had left.

Lindsay passed his hand over his face with the gesture of a completely baffled and worn-out man. He looked up at his wife. "Jenna," he pleaded, "is there—?"

"Don't you trust me, Ralph?"

"My whole being cries out to trust you, Jenna. But there is still wonder."

"There is nothing I can say that will erase that. Nothing. If I am actress enough to play treachery, I'm also liar enough to swear a false oath."

Lindsay nodded.

"Nothing," she repeated dully.

"You think a lot of Grant," he said flatly.

"I've loved them all," she said.

"Grant more than the rest."

"Jack, despite his hard exterior, is an understanding soul."

"That may save him," muttered Lindsay.

"Ralph!"

The jocular voice of Jack Grant broke in: "I'm taking off in the battle buggy now."

"And then again it may not," said Lindsay harshly.

"I'm not a machine, Ralph. I'm a woman."

"So was Circe!"

"Is that what you think of me?"

The loudspeaker chattered: "This is no road for a human being, folks. They paved it with rubble, I think. My tools are rattling around like mad. If any agency is using anything for detection, they're listening to the rattle of machinery in this battle buggy."

Jenna and Ralph faced the radio panel and both hated it for its flat tones. But they could not turn it off.

"He'll go like Roberts, like Har-

ris," snarled Lindsay. "Like—Lacy."

"No!"

"We'll see," he said tritely.

Silence fell, and then the voice again: "I'm approaching the thing. Y'know, it's fearfully quiet out here with the area evacuated and all machinery stopped. The wall shields make the landscape unreal, like the ghost-sequence in a horror movie. Terra was never intended to be seen under a greenish light. You know how people look under mercury vapor lights? That's how Terra looks, sort of."

"Jenna?"

"Yes Ralph."

"You're not . . . you're not—?"

"What can I say?" she pleaded. "I'm only human."

He looked up bitterly. The question was in his eyes. He did not need to voice it. Jenna knew what he was thinking. And he knew that she understood, for the hurt was in her eyes.

"Hey!" came Grant's voice. "I've got us a mascot! C'mere, Ears. Nice fella. 'Tis a woebegone pup, spaniel. Lonely and aching for someone to scratch his tummy. Up, Ears! You're my good luck! The mutt is sitting on the seat like he knew what it was all about. A sharp little rascal. I'll bring him home to you."

Jack drove on, one hand on the wheel and the right hand on the dog's head, stroking gently. *Who,* he wondered, *would leave a pet in a contaminated area? Abandoned to something that no dog could possibly understand.*

And he thought, briefly, that he and the dog were in the same boat.

"You can carry my tool bag," he told the pup over the rumble of the battle buggy.

Jenna and Ralph listened to Grant talking to the dog. The man rattled on, speaking lightly, caressingly to the animal, and his words were banal to the tensity in the scanning room.

"I wish I knew," said Lindsay.

"Ralph, stop it!" cried his wife. "Stop playing around the point. If you think I'm guilty, come out and say so!"

"I'm . . . not certain."

"Have you no faith in me?"

"Jenna, I—"

"Folks, I'm stopping the buggy, and Ears and I will go over and see that thing right now. So far, there's been no mental disturbances, Jenna. That's the one thing I'm watching for."

Lindsay looked at her.

"I don't feel anything," she said. He wondered, again, and it was in his face.

Her voice went out, and Grant answered. "If either of us feel anything—?"

"I'll let you know," she promised.

"Will you?" muttered her husband.

"I will," she blazed at him.

"Lindsay," snapped Grant, "get off of it! Jenna has no more treachery in her soul than I have, and I know my own heart!"

Ralph Lindsay calmed. Jenna

looked at him and knew that the man outside was a sort of safety valve. Her husband was on the verge of breakdown, she guessed, and she was in a nervous state herself. The man out there had been holding the group together for hours, now. What would happen if he went—?

"No!" she pleaded.

But something inside of her knew that he would go, like the rest.

"No!" she said with a half-scream.

"'No' what?" asked Lindsay.

"Grant mustn't!"

Lindsay looked at her. "Isn't that his job?" he said flatly.

"Yes, but—"

"Perhaps you can fix it," said her husband cynically. She looked at him in disbelief. Was this the man she loved?

Then he turned the knife in the wound. "Or," he said vindictively, "is that *your* job?"

"Lindsay, shut up, you fool!"

Lindsay opened his mouth and then closed it again. "Trouble with you, Lindsay, is that you've a rankle or two in your system which should have been burned out a long time ago. You poor fool, don't you know that every man reaches a crossroad every day? There's not one of us who mustn't give up something to get something else. That's why we have asylums—for people who can't make up their minds, or people who dislike their decisions and try to go back, mentally. The normal man accepts his decision and uses that as experience in making the next one, instead of sitting there, spending his life wondering what if he'd taken the other road. Add up your life, Lindsay, and see whether the credits are better than the debits. You can't have everything!"

Then the tone of his voice changed.

"I'm leaving the battle buggy now, and Ears and I are approaching the thing. I have no fear of it, really. I'm . . . curious. What makes these things go off? This, fellers, is a physical phenomenon, developed by human beings—"

"Martians," corrected Lindsay.

"They're classified as human," snapped Grant. "And a lot of them are more human than the pure-white Terran. Spinach, I call it. Anyway, there is a simple explanation for all this and when it is uncovered, all of your rantings and ravings will go to pieces like a bit of charred paper. Call it telepathy if you want—I'm not discounting though I'm skeptical—but I don't feel any warnings yet."

Jenna sat down, closed her eyes, and composed her body into a relaxed pose. She said nothing. Lindsay noted, and said: "Keep it coming, Grant."

"Well," said Grant, "we're at the critical hundred feet, Ears and I. Come here, mutt! That thing is dangerous! Dog doesn't care, folks. Y'know, there's nothing like having a mutt around to teach you faith. Jenna?"

She opened her eyes. "Yes?"

"I'm going in! You're Martian and you're sensitive. Maybe you can catch the backwash if there's any mental shenanigans."

"I'll try."

"Believe it now?" called Lindsay.

"Not entirely. But I'm not missing any bets. Now, I am taking my little hatchet in one hand and I'm going out to . . . *Jenna! You—!*"

The storm burst, the sky flared bright, and the waves of sheer energy beat the ship, stormed in through the windows and the radiation counter shrilled madly. The pillar of fire mounted like a rolling cloud, reaching for the sun.

"Grant," said Lindsay with a dry throat.

Jenna sobbed.

"What did he mean?" demanded Lindsay.

Jenna shook away her tears, swallowed deeply. "I know," she said. "I know."

"You—?"

"I caught it," she said.

"Then it was you," he snapped harshly. "Tell me, Jenna, what kind of enticement did you use to get him going?"

"You fool," she snarled at him. "Blind, stupid fool." She stood up, blazing. "Yes," she said. "I've taken all you gave me, and took it gladly, happily. And I hoped that I could make up to you for . . . for . . . causing your loss. Yet you've never forgotten that I'm Martian, and that if you'd married a Terran you could have the plaudits and the admiration due any fighting officer. That's rankled in your soul until you hate me!" she screamed. "And what could I do? I'd have made it up to you," she said, her voice quieting, "but I didn't know how. And now you think I'm responsible. Well," she said accusingly, "how do I know but that you are planning revenge on Terra for being blind."

"Jenna, you—"

"Well, I do know. And if you think that I'm—"

"What do you want me to think?" he asked her. "What were Grant's last words?"

"He—"

"Accused you!"

Jenna turned quietly. She stopped at the door. "I solved one fuse because I thought Martian," she said quietly. "I'll solve the next one for you! You've wanted to be free to join the Corps in space. Then follow me close, because when I solve this one there will be no question."

"Jenna—what is it?"

"It is the fuse itself," she said. "A rudimentary brain that reacts upon receiving any thought of removal when that thought originates within a hundred feet or so."

"Utterly fantastic!"

"Is it?" she asked. "Watch!"

Jenna passed through the door and left. Moments later, the whine of a skyplane crescendoed and diminished. Jenna was heading for the next site. Lindsay sat for a long time, his mind whirling.

Jenna was right. He'd been fretting over his denial of the right to command. It hadn't been fair. A group of psychoneurotics — commanded by one. Himself. Not denied the right to command because of his wife, but because of his psychotic nature. For one, any Terran who would enter a mixed-marriage was not possessed of the normal ad-

justment, and the same true of any Martian. Secondly, were he normal, fighting in combat would produce a psychotic condition since he'd be set against his wife's countrymen.

He leaped up and ran to the driving panel. Harshly he threw the autopilot out of gear and took the controls himself. The ship took off raggedly and hissed through the upper air, racing.

"Jenna!" he called into the radio.

No answer.

"Jenna! Turn on your receiver! Please," he begged.

No answer.

His trembling hands turned up the power and the ship shuddered at the overload drive. The upper air shrilled against rivet head and port sill. The burble point came and the ship shook and rattled terribly. Yet he knew that he had but an even chance. For Jenna was driving a superspeed plane that could race as fast as the big ship—with less danger in atmosphere.

No spacecraft was made to travel horizontally across a planet. But Ralph Lindsay in a frenzy, swore at the sidelong pace, and turned his ship to arrow through the upper air. The burble died, but throughout the ship came the rattle of falling objects, dumped from table and shelf.

He continued to cry into the microphone, and strained his ears for the answer that was not there.

He depressed the nose of the ship and went into a steep, screaming dive.

He—saw her. A minute speck, even through the telescope.

And at the moment he saw her,

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she stepped from the plane onto the ground, and spoke to him through the radio.

"I've no receiver on, Ralph. But listen—and stay back!"

"Jenna!" he screamed.

"Your duty, remember?" she said quietly. "It is to solve these—things. Your duty, I took away, and now I will return it."

"Jenna!" he pleaded. "I don't want—"

In futility, he gave up. She could not hear. An hypnosis took him, held him in its grip.

"Ralph," she said. "Watch carefully."

He shook himself.

Angrily, he fought the controls. Madly he tried to urge another dyne from the drivers. He would be—too late.

"Jenna! Don't!"

"Ralph, I'm approaching the bomb. I am now seventy feet from it. See?"

Seventy feet?

"I'm seventy feet from it, Ralph, because I've thought only of you. Not once have I thought of defus—"

The blast caught the diving ship and stopped it in its tracks, turned it end for end and sent it rocketing crazily away from the mad scene of turbulence. It arched high into the sky, tumbling. Numb, Lindsay reacted automatically. War, hatred, suspicion. All boiled up in his mind.

The answer? It was clear, finally. The how and the why and the wherefore. His problem—solved.

But the solution was bitter in his mouth.

Instinctively driving the ship toward the next site Lindsay's eyes still saw the pathetic figure silhouetted against that intolerable blast. Solution? She had given him both solutions.

His mind went back through the years. She'd been his, completely. He'd known all the happiness any man needed. Now he was free to take his place—and he didn't want it. What was honor? A mind, clinging to its own ideals. Was there more honor in clinging to his choice or in becoming a public figure, abandoning his choice.

No, Jenna hadn't given it to him. He'd taken it.

More balance, more sensible evaluation of his own set of desires would have kept him from driving her—

He landed his ship flatwise, furrowing the ground. Blindly, he looked across the field toward the—ticking thing.

"Blast!" he snarled at the thing.

He selected tools. Then he faced it again. "Go ahead. Explode." Briefly, he wondered how it would feel—and if any feeling were possible in microseconds.

"I'm coming," he told it.

He hit it a ringing blow with a sledge hammer. "Blast!" he cried angrily.

Down within the robomb, a lacery lacework of silver in a mass of complex hydrocarbon dielectrics sent impulses along flowing filaments of

metal to other shapeless tangles of silver globs. Countercurrents flowed back and the filaments of metal became a tangled highway of multipurposed impulses. Countercurrents canceled and mixed with flowing currents, creating new wave shapes that flowed in both directions from the mixing point, and the silver-shot masses at either end of the multitudinous filamentary transmission lines accepted the false wave shapes, became confused by their unfamiliarity, and sent forth more shapes of meaningless nature.

It was unable to cope with a situation whereby it was commanded to explode. The right act—upon that stimulus—had not been taught—built into—it.

And still the thoughts beat upon the rudimentary brain.

Lindsay climbed atop the thing. "Blast!" he screamed.

The leering face of a Martian looked up at him, and smiled sneeringly. Lindsay snapped his cutting torch and thrust the white-hot flame in the Martian's eye, and the face distorted and became Jenna. She lifted a hand and pushed the flame away. It went, cutting the hard metal around her face. Characters were burned in her forehead, and he read them without understanding. Tiny hands came out through the cut in the metal and wiped Jenna's face from the top of the fuse. They took the white-hot flame in their hands and directed it.

He lifted. He struck at Jack Grant's laughing face with a bar and drove it loose.

"Blast," he told Jack Grant.

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Violently, he pried upon the thing. It came up slowly, like Circe, rising out of the sea—or was it Venus—or Jenna. It was exquisitely formed, delicately shaped, but his hands took it and crushed the softly curving figure into a geometrical cylinder, and the softness left it as he lifted it out of the body of the bomb.

From the vacant hole there came a small flow of neutrons and they registered on the counter he wore.

Lindsay jumped down, the mists clearing. He looked at the thing in his hands and laughed. The laugh welled up and broke into a wild sob. Lindsay crumpled to the ground, holding the fuse in his lap and crying over it.

He cried with grief, raved at his own madness. He ignored his own loss, for had he admitted that, he would have gone mad once more.

Paradox, paradox. He—who had tried to force death—was unable to do so. He was alone and a failure. He hurled the fuse at the vast shell of the robomb.

"Stinking failure," he snarled at it. Then came clearness. He picked up the fuse once more and looked at it. Somewhere in his cloud of madness he had succeeded in defus—

The auxiliary detonator went BANG! and startled him from the last hazy mists of madness into cold reality.

Once back in the loneliness of his ship, he called Haynes. He reported all, in a dull voice and asked for help. Later, the help came to find Lindsay working over the two-ended artificial mind, measuring minute electronic impulses and stimulating the nodules of the filamentary connectors to see what happened. From this sample, he knew that the Terran Technical Corps could devise a means of confusing the mental fuses in other robombs.

Ralph Lindsay concluded his lecture to the members of his reconstructed Decontamination Squadron. Then he turned away from them and a bitterness twisted his mouth as he looked up into the sky at the flight squadron that was passing overhead.

It still was not for Lindsay.

He picked up the counter-mentapath and started the battle buggy across the rough field toward the waiting Martian robomb. In the back of his mind was a half-formed prayer that some day he might find one too complicated for him. But until that day he would search for that peace he knew that he would never find.

THE END.

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